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ON THE APPLICATION OF THE GENERIC NAME MELODORUM OF LOUREIRO

By E. D. MERRILL

Botanist, Bureau of Science, Manila

The genus *Melodorum* was proposed by Loureiro [1] in 1790 for two species from Cochinchina, *Melodorum fruticosum* Lour. and *M. arboreum* Lour., of which the first is manifestly the type of the genus. While the description is not very definite, and while manifestly the fruit characters are based on material from some plant different from the type and in all probability not congeneric with it, it seems to be distinctly advisable to investigate the status of the genus in view of the misinterpretation of it in all modern botanical literature.

Fortunately for the purpose of this investigation Loureiro's type of *Melodorum fruticosum* is preserved in the herbarium of the British Museum, and through the kindness of Dr. A. B. Rendle and Mr. J. G. Baker I have been supplied with a sketch of it with certain notes regarding the specimen. The material consists of a leafy branch with the broken pieces of a flower, from which it was possible to sketch an entire petal.

After receiving the sketch mentioned above it was matched by material in the herbarium of the Bureau of Science and in order to verify my interpretation of Loureiro's species fragments of several specimens were forwarded to the British Museum for purposes of direct comparison with Loureiro's type. In reference to this material Doctor Rendle notes under date of July 3, 1919:

> Loureiro's plant is very much like the one labeled *Polyalthia siamensis* Boerl., cult. Hort. Bog.; the large petals seem identical in form but the

[1] Fl. Cochinch. (1790) 351.

prominent lateral veins of the leaf are rather less numerous (about 10 or 11 on each side) in Loureiro's plant, and also slightly farther apart. The twigs are also thicker in Loureiro's specimen. We find nothing that agrees better with it.

Dunal [2] seems to be the first author to adopt Loureiro's generic name, making it a section of the genus *Unona*. He referred both of Loureiro's species to *Unona; Melodorum fruticosum* Lour. = *Unona dumetorum* Dunal and *Melodorum arboreum* Lour. = *Unona sylvatica* Dunal. He saw no specimen but interpreted both species from Loureiro's descriptions. In proposing the section *Melodorum*, Dunal referred to it several other species; *Unona latifolia* Dunal = *Melodorum latifolium* Hook. f. & Th., *U. lucida* DC. = *Xylopia longifolia* A. DC., *Unona acutiflora* Dunal = *Xylopia* sp., *Unona xylopoides* Dunal, and *Unona polycarpa DC.* = *Xylopia polycarpa* Oliv.

In current botanical literature the authority for the generic name *Melodorum* is given as Hooker f. and Thomson,[3] but these authors credit the authority for the genus to Dunal, citing as synonyms *Unona*, section *Melodorum* Dunal; *Uvaria*, section *Melodorum* Blume; and *Polyalthia*, section *Kentia* Blume. Hooker f. and Thomson apparently interpreted the genus largely from the first species cited by Dunal; namely, the Malayan one currently known as *Melodorum latifolium* (Dunal) Hook f. & Th., described and figured by Blume as *Uvaria latifolia* Blume.[4]

Hooker f. and Thomson examined Loureiro's type of *Melodorum fruticosum* in the herbarium of the British Museum with the following comment:

> Loureiro's *Melodorum* is different, as we have determined by an inspection of the materials in the British Museum. In that collection there is an authentic specimen of *M. fruticosum* Lour., which is an undescribed plant, of doubtful affinity, as we have not examined the flower, but certainly not belonging to this genus. It has no fruit. There is no authentic specimen of *M. arboreum* Lour., but it is described as a large tree and is perhaps a *Mitrephora*.

While they excluded both of Loureiro's species from *Melodorum*, Hooker f. and Thomson considered it advisable to retain the generic name in the sense in which it was interpreted (in part) by Dunal and by Blume (as a section of *Unona* and of *Uvaria*). All subsequent authors have been content to follow Hooker f. and Thomson, and we hence have an entirely illogical

[2] Monogr. Fam. Anon. (1817) 98, 115, 116.
[3] Fl. Ind. (1855) 112.
[4] Fl. Jav. Anon. (1828) 37, *t. 15, 25A*.

case of a generic name proposed by Loureiro currently applied to a group of species quite different from Loureiro's original conception of the genus.

From an examination of the sketch of Loureiro's type kindly prepared by Mr. J. G. Baker I am confident that *Melodorum fruticosum* Lour. is the species currently known as *Polyalthia aberrans* Maingay and which has been variously described by several authors as *Polyalthia affinis* Teysm. & Binn., *P. siamensis* Boerl., and *Unona mesneyi* Pierre, and which was eventually transferred to *Popowia* by Pierre as *Popowia aberrans* Pierre. From this I cannot distinguish *Popowia diospyrifolia* Pierre by any satisfactory characters. Pierre [5] has given a detailed account of the characters of this species, indicating that it approaches *Popowia* in certain respects, but concluding that it cannot be referred to Endlicher's genus. He found that it is, in most respects, a *Polyalthia* but proposed for it the group name *Mesneya*, as a subgenus of *Unona*. Safford [6] has clearly shown that the so-called Old World species of *Unona* have nothing to do with *Unona* as originally described by the younger Linnaeus, this being an American genus, the proper generic name for the Old World species being *Desmos* Lour. King [7] notes that *Polyalthia aberrans* Maing., as interpreted by him, "save, and except in the much smaller size of the flowers," much resembles the plant figured and described by Pierre under the name of *Unona mesneyi*, and to which Pierre reduced *Polyalthia aberrans*. An examination of Cochinchina material now available to me for study and comparison shows that the size of the flowers in Pierre's drawing is greatly exaggerated, and that they are drawn all out of proportion to the leaves.

In interpreting the true status of *Melodorum* as described by Loureiro, we find that the type of the genus is a species aberrant in all of the genera in which it has been placed. It is to be noted that Pierre proposed for it the group name *Mesneya* (as a subgenus), and that Scheffer, quoted by Boerlage,[8] proposed for the same form the generic term *Sphaerocoryne*. For the present it seems best to retain *Melodorum* as a genus closely allied to *Popowia*, for which the names *Mesneya* Pierre and *Sphaerocoryne* Scheffer are exact synonyms. *Polyalthia*

[5] Fl. Forest. Cochinch. 1 (1880) *t. 17*.

[6] Bull. Torr. Bot. Club 39 (1912) 501–508.

[7] Ann. Bot. Gard. Calcutta 4 (1893) 78.

[8] Boerl. in Ic. Bogor. 1 (1899) 196, in nota sub *Polyalthia siamensis* Boerl.

Blume may then be retained for the numerous Indo-Malayan species currently so called, but the various species of *Melodorum* of all authors except Loureiro will need a new generic name, for which *Fissistigma* Griff. is available.

MELODORUM Loureiro

MELODORUM FRUTICOSUM Lour. Fl. Cochinch. (1790) 351.

Unona dumetorum Dunal Monog. Anon. (1817) 31.

Polyalthia (?) *aberrans* Maingay in Hook. f. Fl. Brit. Ind. 1 (1874) 67; King in Ann. Bot. Gard. Calcutta 4 (1893) 78, *t. 109A.*

Polyalthia affinis Teysm. & Binn. in Nat. Tijdschr. Nederl. Ind. 27 (1864) 37; Boerl. in Ic. Bogor. 1 (1899) 124, 183, *t. 63.*

Polyalthia siamensis Boerl. in Ic. Bogor. 1 (1899) 124, 195, *t. 69.*

Sphaerocoryne siamensis Scheff. ex Boerl. l. c. in syn.

Popowia aberrans Pierre ex Finet & Gagnep. in Bull. Soc. Bot. France 53 (1906) Mem. 4: 109, et in Lecomte Fl. Gén. Indo-Chine 1 (1907) 83.

Unona mesneyi Pierre Fl. Forest. Cochinch. 1 (1880) *t. 17.*

Popowia diospyrifolia Pierre ex Finet & Gagnep. in Bull. Soc. Bot. France 53 (1906) Mém. 4: 110, et in Lecomte op. cit. 84, *t. 10, f. 11–19.*

Melodorum glaucum Scortech. ex King in Ann. Bot. Gard. Calcutta 4 (1893) 78, in syn.

Melodorum clavipes Hance in Journ. Bot. 15 (1877) 328.

There may be more than one species represented here, but if so they are very closely allied. According to Loureiro (*Melodorum fruticosum*), Boerlage (*Polyalthia affinis* Teysm. & Binn., *P. siamensis* Boerl.,), Pierre (*Unona mesneyi* Pierre), and Gagnepain (*Popowia aberrans* Pierre, *P. diospyrifolia* Pierre), it is an erect shrub or small tree, but according to Maingay and King it is a scandent shrub. The difference between *Polyalthia siamensis* Boerl. (*Polyalthia aberrans* Maing.) and *P. affinis* Teysm. & Binn. appears to me to be trivial. As between *Popowia aberrans* Pierre and *P. diospyrifolia* the same statement holds, the distinguishing character depended upon being only that of the stigma. It is to be noted that Finet and Gagnepain consider that Pierre's drawing of *Unona mesneyi*, as to the habit sketch, is *Popowia aberrans* Pierre, and as to the details of the flower, *P. diospyrifolia* Pierre.

The species extends from Indo-China to Siam and the Malay Peninsula and is in cultivation at Buitenzorg, Java. I have examined the following specimens: Indo-China, *Loureiro* (sketch of Loureiro's type as preserved in the herbarium of the British Museum, flowering specimen), *Thorel 391* (det. by Gagnepain as *Popowia diospyrifolia* Pierre, flowering specimen): Malay Peninsula, Pungah, *Curtis 2957;* Goping, *Kunstler 6136;* Ma-

lacca, *Burkill 2510;* Perak, *Scortechini 1946* (all these distributed as *Polyalthia aberrans* Maing., flowering specimens) : Java, *cult. Hort. Bogor XI–A–41–71* (four sheets, *Polyalthia siamensis* Boerl., flowering specimens from the type plant), *XI–A–63* (*Polyalthia affinis* Teysm. & Binn., flowering and fruiting specimens).

As several detailed descriptions of this species, as well as no less than four illustrations of it, with details of the flowers and fruits, have been published, it would seem that a further description is unnecessary. The genus *Melodorum* Lour., as I understand it, contains a single definitely known species, which while well defined and characteristic as a species presents a combination of characters which render it somewhat difficult to separate *Melodorum* from several not closely allied genera. It is clearly no *Unona* (that is, *Desmos*) ; and it is equally aberrant in *Polyalthia* and in *Popowia,* the two other genera in which it has been placed. I am personally of the opinion that *Melodorum* as originally described by Loureiro and typified by *Melodorum fruticosum* Lour. (not of modern authors) is a valid genus, more closely allied to *Popowia* than to *Polyalthia,* and that it belongs in the tribe *Mitrephorae.* Pierre in his critical discussion of *Unona mesneyi* notes that Maingay described the inner petals as imbricate in bud, but that he found them to be perfectly valvate in Wallich's specimen. Both series of petals touch by their thickened margins, and those of the inner series remain in this position long after anthesis. I have seen no fresh material of *Melodorum fruticosum,* but the figures given by Pierre, Boerlage, and King present the outer series of petals as more or less spreading in anthesis; in all the herbarium specimens examined by me none of the petals are spreading. The persistent valvate position of the inner petals is a character by which the genus can be readily distinguished from *Polyalthia* and all the other genera in the tribe *Unonae;* while in the *Mitrephorae* it is readily distinguished from *Fissistigma* Griff. (*Melodorum* auct., non Lour.) by its globose buds and more or less spreading (?) outer petals; from *Popowia* Endl., which seems to be its true alliance, it differs entirely not only in its facies, but also in its larger, long-pedicelled flowers; in its outer petals, which are much larger and entirely different from the sepals; and by the inner petals being valvate by their much thickened margins but not connivent.

Melodorum arboreum Lour.[9] = *Unona sylvatica* Dunal,[10] the

[9] Fl. Cochinch. (1790) 351.
[10] Monog. Anon. (1817) 91.

second species of the genus described by Loureiro, is one of doubtful status, but in all probability is not congeneric with *Melodorum fruticosum* Lour. It is described as a large tree growing in forests, the leaves tomentose beneath, the calyx and corolla as in *Melodorum fruticosum* Lour. The indicated floral characters can be considered as no more than approximate. Hooker f. and Thomson have suggested that this may prove to be a *Mitrephora* and, from the description and the various species of *Mitrephora* now known from Indo-China, I strongly suspect that Loureiro's species is the same as *Mitrephora thorelii* Pierre.

It is perfectly evident that whatever disposition be made of *Melodorum* as originally described by Loureiro, whether it be considered as a valid genus allied to *Popowia*, or whether it be considered as synonymous with *Popowia*, or with *Polyalthia*, it can no longer be retained in the sense in which it is currently used; that is, as erroneously interpreted by Hooker f. and Thomson. The genera proposed by other authors currently considered as synonyms of *Melodorum* Hook. f. & Th., are *Fissistigma* Griff. (1854), *Mitrella* Miq. (1865), and *Pyramidanthe* Miq. (1865). Of these *Fissistigma* Griff. is an exact synonym of *Melodorum* as interpreted by Hooker f. and Thomson and antedates *Melodorum* as used by the latter authors by one year. It is typified by *Fissistigma scandens* Griff.[11] I accordingly propose to adopt Griffith's generic name for the numerous species currently but erroneously known as *Melodorum*. Boerlage[12] retains *Kentia* Miq. and *Pyramidanthe* Miq. as valid genera allied to *Melodorum* Hook. f. & Th., that is, *Fissistigma* Griff.; but in this consideration of the case I have followed current usage and have reduced both to *Fissistigma*.

FISSISTIGMA Griffith

(*Melodorum* auct. plur., non Lour.)

FISSISTIGMA AFRICANUM (Benth.).

Melodorum africanum Benth. in Trans. Linn. Soc. 23 (1862) 477.

Africa.

FISSISTIGMA BALANSAE (Aug. DC.).

Melodorum balansae Aug. DC. in Bull. Herb. Boiss. II 4 (1904) 1070; Finet & Gagnep. in Lecomte Fl. Gén. Indo-Chine 1 (1907) 104.

Indo-China.

[11] Notul. 4 (1854) 706.
[12] Ic. Bogor. 1 (1899) 129, 130.

FISSISTIGMA BECCARII (Scheff.).

Melodorum beccarii Scheff. in Ann. Jard. Bot. Buitenz. 2 (1885) 24.
Mitrella beccarii Diels in Engl. Bot. Jahrb. 49 (1912) 149.

New Guinea.

FISSISTIGMA BICOLOR (Roxb.).

Uvaria bicolor Roxb. Fl. Ind. ed. 2, 2 (1832) 662.
Melodorum bicolor Hook. f. & Th. Fl. Ind. (1855) 119; King in Ann. Bot. Gard. Calcutta 4 (1894) 133, *t. 175B.*

Eastern Himalayan region to Assam and Burma.

FISSISTIGMA BORNEENSE (Miq.)

Melodorum borneense Miq. in Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 36.

Borneo.

FISSISTIGMA CINERASCENS (Miq.).

Melodorum cinerascens Miq. Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 37.

Sumatra.

FISSISTIGMA CHRYSOSERICEUM (Finet & Gagnep.).

Melodorum chrysosericeum Finet & Gagnep. in Bull. Soc. Bot. France 54 (1907) 88, et in Lecomte Fl. Gén. Indo-Chine 1 (1907) 98, *f. 12.*

Indo-China, *Thorel 2429!*

FISSISTIGMA CYLINDRICUM (Maingay).

Melodorum cylindricum Maingay in Hook. f. Fl. Brit. Ind. 1 (1872) 80; King in Ann. Bot. Gard. Calcutta 4 (1893) 136, *t. 177B.*
Melodorum cylindraceum Boerl. in Ic. Bogor. 1 (1899) 133.

Malay Peninsula, Singapore, Borneo, *Ridley 1823!, s. n.!*

FISSISTIGMA ELEGANS (Wall.).

Uvaria elegans Wall. Cat. (1832) No. 6474A, *nomen nudum.*
Melodorum elegans Hook. f. & Th. Fl. Ind. (1855) 122; King in Ann. Bot. Gard. Calcutta 4 (1893) 141, *t. 184B.*

Malay Peninsula, Penang, *Wray 1079!, King's collector 6367!, Kunstler 5115!, Ridley 13516!, s. n.!*

FISSISTIGMA FAGIFOLIUM (Ridl.).

Melodorum fagifolium Ridl. in Kew Bull. (1912) 286.

Borneo, *Hose 397!*

FISSISTIGMA FULGENS (Wall.).

Uvaria fulgens Wall. Cat. (1832) No. 6482, *nomen nudum.*
Mitrephora fulgens Hook. f. & Th. Fl. Ind. (1855) 120; King in Ann. Bot. Gard. Calcutta 4 (1893) 132, *t. 174.*

Malay Peninsula, Singapore, Borneo (not in the Philippines!), *Kunstler 2654!, Haniff & McNur 2317!, Wray 2441! Ridley 4587!*

FISSISTIGMA GLAUCESCENS (Hance).

Melodorum glaucescens Hance in Journ. Bot. 19 (1881) 112.

Hongkong.

FISSISTIGMA HYPOGLAUCUM (Miq.).

Melodorum hypoglaucum Miq. Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 37; King in Ann. Bot. Gard. Calcutta 4 (1893) 136, *t. 180A*.

Malay Peninsula, Borneo, Sumatra, *King's collector 5060!, 5806!, 1022!*

FISSISTIGMA KENTII (Blume).

Unona kentii Blume Bijdr. (1825) 16.
Polyalthia kentii Blume Fl. Jav. Anon. (1828) 77, *t. 38, 52A*.
Melodorum kentii Hook. f. & Th. Fl. Ind. (1855) 116.
Mitrella kentii Miq. Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 39; Boerl. in Ic. Bogor. 1 (1899) 130, *t. 43, f. C*.

Java, cult. Hort. Bogor. *XI-A-29-64!* Boerlage, l. c., retains this as a distinct genus.

FISSISTIGMA KINABALUENSE (Stapf).

Melodorum kinabaluense Stapf in Trans. Linn. Soc. Bot. 4 (1894) 130.

Borneo.

FISSISTIGMA KORTHALSII (Miq.).

Melodorum korthalsii Miq. Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 37.

Borneo.

FISSISTIGMA LANUGINOSUM (Hook. f. & Th.).

Melodorum lanuginosum Hook. f. & Th. Fl. Ind. (1855) 117; in Ann. Bot. Gard. Calcutta 4 (1893) 138, *t. 182*.
Uvaria tomentosa Wall. Cat. (1832) No. 6454, *nomen nudum*.

Malay Peninsula, Penang, Singapore, Indo-China, *King's collector 4664!, 7890!, 4581!, Hullett s. n.!, Ridley s. n.!*

FISSISTIGMA LATIFOLIUM (Dunal).

Unona latifolia Dunal Monog. Anon. (1817) 115.
Uvaria longifolia Blume Bijdr. (1825) 13.
Uvaria latifolia Blume Fl. Jav. Anon. (1828) 37, *t. 15*.
Melodorum mollissimum Miq. Fl. Ind. Bat. Suppl. (1861) 374.
Melodorum latifolium Hook. f. & Th. Fl. Ind. (1855) 116; King in Ann. Bot. Gard. Calcutta 4 (1894) 135, *t. 178*.

Malay Peninsula (Perak), Java, Mt. Salak, *ex herb. Bogor.!* collector not indicated. Borneo, Indo-China, fide Gagnepain, Moluccas.

The type of this species is *Cananga sylvestris III latifolia* Rumph.[13] of Amboina. The species is currently interpreted from Blume's figure and description which were based on Javan material. Boerlage expresses the opinion that *Melodorum mollissimum* Miq. is specifically distinct from *M. latifolium* Hook. f. & Th.

FISSISTIGMA LEICHHARDTII (Benth.).

Melodorum leichhardtii Benth. Fl. Austral. 1 (1863) 52.

Australia (Queensland, N. S. Wales), *White! Boorman!*

FISSISTIGMA LITSAEFOLIUM (King).

Melodorum litsaefolium King in Journ. As. Soc. Beng. 61 [2] (1889) 103, Ann. Bot. Gard. Calcutta 4 (1893) 132, *t. 173.*

Malay Peninsula, Perak, *King's collector 4986!, 4063.*

FISSISTIGMA LONGIPETALUM (Ridl.).

Melodorum longipetalum Ridl. in Kew Bull. (1912) 387.

Borneo.

FISSISTIGMA MABIFORME (Griff.).

Uvaria mabiformis Griff. Notul. 4 (1854) 709.
Melodorum pisocarpum Hook. f. & Th. Fl. Ind. (1855) 123; King in Ann. Bot. Gard. Calcutta 4 (1893) 142, *t. 187A.*
Melodorum pyramidale Maingay ex King l. c. in syn.

Malay Peninsula, Singapore, Sumatra, *King's collector 6411!, 10602!, Forbes 2182!, Ridley s. n.!*

FISSISTIGMA MACCREAI (F. Muell.).

Melodorum maccreai F. Muell. Fragm. 6 (1867) 176.

Australia.

FISSISTIGMA MACRANTHUM (Kurz).

Melodorum macranthum Kurz in Journ. As. Soc. Beng. 41 [2] (1872) 291; King in Ann. Bot. Gard. Calcutta 4 (1892) 140, *t. 186.*
Unona macrantha Kurz in Andam. Rep. (1867) App. B. I.
Pyramidanthe macrantha Kurz op. cit. ed. 2 (1870) 29.

South Andaman, *Kurz!*

FISSISTIGMA MAINGAYI (Hook. f. & Th.).

Melodorum maingayi Hook. f. & Th. Fl. Ind. (1855) 139; King in Ann. Bot. Gard. Calcutta 4 (1893) 139, *t. 184A.*

Malay Peninsula, Penang, Borneo, *Wray 1112!*

[13] Herb. Amb. 2: 198.

FISSISTIGMA MANUBRIATUM (Wall.).

Uvaria manubriata Wall. Cat. (1832) No. 6456, *nomen nudum.*
Melodorum manubriatum Hook. f. & Th. Fl. Ind. (1855) 118; King in Ann. Bot. Gard. Calcutta 4 (1893) 134, *t. 176.*
Melodorum bancanum Scheff. in Nat. Tijdschr. Nederl. Ind. 31 (1870) 343, Flora 53 (1870) 244.

Malay Peninsula, Penang, Bangka, Borneo, *Kunstler 7832!, King's collector 4948!, 5786!, Ridley 4712!, Cult. Hort. Bogor. XVI–E–107!, XI–A–45–67!*

FISSISTIGMA OBLONGUM (Craib).

Melodorum oblongum Craib in Kew Bull. (1914) 5.

Siam, *Kerr 1879!*

FISSISTIGMA OLDHAMII (Hemsl.).

Melodorum oldhamii Hemsl. in Journ. Linn. Soc. Bot. 23 (1886) 27.

Formosa, Southern China, *Dunn 6339!, Faurie 430!, Tutcher 1052!, Japanese collector 1292!*

FISSISTIGMA OVALIFOLIUM (Ridl.).

Melodorum ovalifolium Ridl. in Kew Bull. (1912) 387.

Borneo.

FISSISTIGMA OVOIDEUM (King).

Melodorum latifolium Hook. f. & Th. var. *ovoidea* King in Journ. As. Soc. Beng. 61 [2] (1892) 106, Ann. Bot. Gard. Calcutta 4 (1893) 135, *t. 179.*

Malay Peninsula, Singapore, *King's collector 8119!, 10418!, Burkill!*

This differs remarkably from the typical form of *Melodorum latifolium* as figured and described by Blume in its very much larger, entirely different fruits, and is certainly worthy of specific rank.

FISSISTIGMA PALLENS (Finet & Gagnep.).

Melodorum pallens Finet & Gagnep. in Bull. Soc. Bot. France 53 (1906) Mém. 4: 137, et in Lecomte Fl. Gén. Indo-Chine 1 (1907) 100, *t. 11, f. 7–11.*

Indo-China.

FISSISTIGMA PANICULATUM (Ridl.).

Melodorum paniculatum Ridl. in Kew Bull. (1912) 386.

Borneo.

FISSISTIGMA PARVIFLORUM (Scheff.).

Melodorum parviflorum Scheff. in Nat. Tijdschr. Nederl. Ind. 31 (1870) 344, Flora 53 (1870) 244; King in Ann. Bot. Gard. Calcutta 4 (1893) 137, *t. 181.*

Malay Peninsula, Bangka, Borneo, *King's collector 7276! 8366!, 6498!*

FISSISTIGMA POLYANTHOIDES (Aug. DC.).

Melodorum polyanthoides Aug. DC. in Bull. Herb. Boiss. II 4 (1904) 1070; Finet & Gagnep. in Lecomte Fl. Gén. Indo-Chine 1 (1907) 103.

Indo-China, *Thorel 2431!*

FISSISTIGMA POLYANTHUM (Wall.).

Uvaria polyantha Wall. Cat. (1831) No. 6467, *nomen nudum.*
Melodorum polyanthum Hook. f. & Th. Fl. Ind. (1855) 121; King in Ann. Bot. Gard. Calcutta 4 (1893) 131, *t. 172A.*

Chittagong.

FISSISTIGMA PRISMATICUM (Hook. f. & Th.).

Melodorum polyanthum Hook. f. & Th. Fl. Ind. (1855) 121; King in Ann. Bot. Gard. Calcutta 4 (1894) 140, *t. 185.*
Uvaria rufa Wall. Cat. (1832) No. 6455, *nomen nudum.*
Pyramidanthe rufa Miq. Ann. Mus. Bot. Lugd.-Bat. 2 (1863) 39; Boerl. in Ic. Bogor. 1 (1899) 130, *t. 43, f. D.*
Oxymitra bassiaefolia Teysm. & Binn. in Nat. Tijdschr. Nederl. Ind. 25 (1863) 419.

Malay Peninsula, Singapore, Borneo, *King's collector 5737!, 3932!, Baker 5705!*

Boerlage retains *Pyramidanthe* Miquel as a genus distinct from *Melodorum* (*Fissistigma*).

FISSISTIGMA PUNCTULATUM (Baill.).

Melodorum punctulatum Baill. in Adansonia 10 (1871) 107.

New Caledonia.

FISSISTIGMA RIGIDUM (Ridl.).

Melodorum rigidum Ridl. in Kew Bull. (1912) 386.

Borneo.

FISSISTIGMA RUBIGINOSUM (A. DC.).

Uvaria rubiginosa A. DC. in Mém. Soc. Phys. Genèv. 5 (1832) 202.
Uvaria nervosa Wall. Cat. (1832) No. 6479, *nomen nudum.*
Uvaria fulva Wall. op. cit. No. 6427, *nomen nudum.*
Melodorum rubiginosum Hook. f. & Th. Fl. Ind. (1855) 138; King in Ann. Bot. Gard. Calcutta 4 (1893) 138, *t. 183.*

Sylhet to Chittagong, Tenasserim, Penang (var. *oblongum* King, *King's collector 5082!*), Indo-China, and Borneo.

FISSISTIGMA RUFINERVE (Hook. f. & Th.).

Melodorum rufinerve Hook. f. Th. Fl. Ind. 1 (1855) 121; King in Ann. Bot. Gard. Calcutta 4 (1893) 130, *t. 171B.*

India.

FISSISTIGMA RUFUM (Presl).

Anona rufa Presl Rel. Haenk. 2 (1830) 75.
Melodorum clementis Merr. in Philip. Journ. Sci. 3 (1908) Bot. 136.
Melodorum rufum Merr. op. cit. 223.

This species was originally described from Luzon material and it extends from central Luzon to Mindanao. It is closely allied to *Fissistigma latifolium* (Dunal) Merr. (*Melodorum latifolium* Hook. f. & Th.), and Philippine specimens of it have been referred to the latter species.

FISSISTIGMA SCANDENS Griff. Notul. 4 (1854) 706.

Melodorum griffithii Hook. f. & Th. Fl. Ind. (1855) 120; King in Ann. Bot. Gard. Calcutta 4 (1893) 131, *t. 172B.*

Burma, Indo-China.

FISSISTIGMA SCHLECHTERI (Diels).

Mitrella schlechteri Diels in Engl. Bot. Jahrb. 49 (1912) 150.

New Guinea.

FISSISTIGMA SCHEFFERI (Pierre).

Melodorum schefferi Pierre ex Finet & Gagnep. in Bull. Soc. Bot. France 53 (1906) Mém. 4: 134, et in Lecomte Fl. Gén. Indo-Chine 1 (1907) 99, *t. 13, f. 1–8.*

Indo-China.

MELODORUM SPHAEROCARPUM (Blume) Miq. Fl. Ind. Bat. 1 [2] (1858) 35; King in Ann. Bot. Gard. Calcutta 4 (1893) 137, *t. 180B.*
Unona sphaerocarpa Blume Bijdr. (1825) 12, Fl. Jav. Anon. (1828) 39, *t. 16.*

Malay Peninsula, Java, *King's collector 4002!, Backer 25558!*

FISSISTIGMA THORELII (Pierre).

Melodorum thorelii Pierre ex Finet & Gagnep. in Bull. Soc. Bot. France 53 (1906) Mém. 4: 133, et in Lecomte Fl. Gén. Indo-Chine 1 (1907) 97, *t. 14, f. 1–6.*

Indo-China.

FISSISTIGMA TONKINENSE (Finet & Gagnep.).

Melodorum tonkinense Finet & Gagnep. in Bull. Soc. Bot. France 53 (1906) Mém. 4: 135, et in Lecomte Fl. Gén. Indo-Chine 1 (1907) 100, *t. 12, f. 1–6.*

Indo-China.

FISSISTIGMA UHRII (F. Muell.).

Melodorum uhrii F. Muell. Fragm. 6 (1867) 2.

Australia.

FISSISTIGMA UONICUM (Dunn).

Melodorum uonicum Dunn in Journ. Bot. 48 (1910) 323.

Hongkong.

FISSISTIGMA VERRUCOSUM (Hook. f. Th.).

Melodorum verrucosum Hook. f. & Th. Fl. Ind. (1855) 119; King in Ann. Bot. Gard. Calcutta 4 (1893) 134, *t, 177A*.

India. The Hainan specimen referred here by Hance probably represents some other species.

FISSISTIGMA WALLICHII (Hook. f. & Th.).

Melodorum wallichii Hook. f. & Th. Fl. Ind. (1855) 118; King in Ann. Bot. Gard. Calcutta 4 (1894) 133, *t. 175A*.

Uvaria bicolor Wall. Cat. (1832) No. 6466, *nomen nudum*, non Roxb.

Assam, Khasia, and Sylhet.

FISSISTIGMA ZIPPELII (Miq.).

Melodorum zippelii Miq. Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 38.

Sumatra.

DOUBTFUL AND EXCLUDED SPECIES

MELODORUM MICRANTHUM Warb. in Engl. Bot. Jahrb. 18 (1893) 190 = *Papualthia longirostris* (Scheff.) Diels in Engl. Bot. Jahrb. 49 (1912) 140, *f. 1, G-H* (*Goniothalamus longirostris* Scheff., *G. inaequilaterus* K. Schum. & Lauterb.).

MELODORUM LEFEVRII Baill. in Adansonia 10 (1871) 108. The type was from Indo-China. I can find no mention of the species in Finet & Gagnepain's treatment of the Annonaceae of Indo-China in Lecomte Fl. Gén. Indo-Chine 1 (1917) 42–123.

THE JUMPING PLANT LICE OF THE PALÆOTROPICS AND THE SOUTH PACIFIC ISLANDS

FAMILY PSYLLIDÆ, OR CHERMIDÆ, HOMOPTERA

By David L. Crawford

Of the College of Hawaii, Honolulu

THREE PLATES AND THREE TEXT FIGURES

Our knowledge of the psyllid fauna of the Old World Tropics is gradually being extended, though it is far from complete. It appears that the subfamilies Pauropsyllinæ and Carsidarinæ are much more extensively represented in this part of the world than in either the North or the South Temperate Zone, and perhaps are the chief groups in numbers of species.

This family is widely distributed and often numerously represented, even on the Pacific islands. Some very interesting evolutional features are to be noted in the psyllid faunæ of certain island groups. The most remarkable is that of the Hawaiian Archipelago, where thirteen of the fifteen known species are apparently derivatives of one species long ago established here. Some of these species have diverged so far from the ancestral type, a *Trioza*, that two other generic groups embrace them.

In the Malay Archipelago there is another interesting group, *Megatrioza*. This genus of the Triozinæ is most numerously represented in this Archipelago but extends into the Philippines and south into Australasia, and one species has found its way as far as the Hawaiian Islands. Several other genera, more fully treated on subsequent pages, appear to have sprung from this one.

Economically, this family is of less importance than the Aphididæ and much less than the Coccidæ. A few species in the Palæotropics cause considerable damage, and no doubt when the habits of certain other species are known the number of economically important species will be augmented.

Buckton's *Psylla isitis* (probably the same as *Arytaina punctipennis* Crawford '12: 431) is a pest on indigo; and *Euphalerus citri*, on citrus trees. The habits of the majority of the species herein described are unknown.

A detailed description of the anatomy and the taxonomy of the family, as a whole, is given in my monograph and need not be repeated here. However, a key to the subfamilies represented in the Old World Tropics is included here for convenience.

This taxonomic work is made possible chiefly through the extensive collecting activities of Prof. C. F. Baker and of Mr. Frederick Muir.

Key to the subfamilies of the Psyllidæ.

a^1. Frons usually visible as a small sclerite, bearing front ocellus; genæ seldom produced into processes; body short and robust; thorax strongly arched, head strongly deflexed; coxal spurs short.
Pauropsyllinæ Crawford.

a^2. Frons covered by genæ and not visible, except a very narrow border around front ocellus; body usually more elongate; coxal spurs usually not very short.

b^1. Genal processes (cones) usually wanting and head deeply cleft in front between the antennæ or, if head is not cleft, the forewings have one or two pseudo (cross) veins; body typically long and slender; forewings elongate and often with pseudoveins; basal tarsus of hind legs usually with only one clawlike spine at apex.
Carsidarinæ Crawford.

b^2. Genal processes (cones) usually present and head not cleft in front, except as the divergent genal cones may give the appearance of a cleft; forewings never with pseudoveins.

c^1. Forewings with cubital petiole (media and cubitus with a common stem); basal tarsus of hind legs with two clawlike spines at apex.
Psyllinæ Puton.

c^2. Forewings usually without cubital petiole (the radius, media, and cubitus all emerging from basal vein at the same point); basal tarsus of hind legs with no clawlike spines at apex.
Triozinæ Puton.

PAUROPSYLLINÆ

Body robust; thorax strongly arched, broad; head short, much deflexed, rounded forward and downward, with eyes prominent; genal cones usually wanting or small and not prominent; frons usually visible, bearing the anterior ocellus at upper end; antennæ usually short, often with long setæ at apex. Legs slender and usually not large. Forewings large, usually broadly rounded at the apex, venation various. Many of the species of this subfamily are gall makers.

Key to the genera.

a^1. Genæ not produced into distinct conical processes, but sometimes more or less swollen beneath (somewhat conical in *Paurocephala magnifrons* Crawford.

b^1. Hind legs not larger than middle pair, apparently not saltatory, hind coxæ small, and coxal spur nearly wanting.... Apsylla Crawford.

b^2. Hind legs longer than middle pair, apparently saltatory; metacoxæ much larger than mesocoxæ, and metacoxal spur well developed.

c^1. Forewings membranous, more or less transparent.

d^1. Media, cubitus, and radius not forking at same point from basal vein; hind wings not nearly wanting.

e^1. Antennæ short, seldom longer than head and thorax combined; head usually much deflexed and retracted into large prothorax.

f^1. First marginal cell of forewing narrow and long, paralleling posterior margin; media-cubital stem as long or nearly as long as radial stem; metacoxal spur usually long, four to eight times as long as thick; antennæ usually longer than width of head; genæ sometimes swollen conspicuously beneath antennal bases..... Paurocephala Crawford.

f^2. First marginal cell not narrow and long; media-cubital stem usually shorter than radial stem or wanting. Metacoxal spur usually very short, one to three times as long as thick; antennæ typically very short, seldom longer than width of head; genæ seldom swollen.

Pauropsylla Rübsaamen.

e^2. Antennæ longer than head and thorax combined; head less deflexed and retracted into prothorax.

f^1. Antennæ not longer than body to tip of abdomen; metascutum with two prominent hornlike epiphyses projecting upward ..... Diceraopsylla Crawford.

f^2. Antennæ very long and slender, longer than body to tip of abdomen; metascutum without horns; genæ swollen, often spherical beneath antennal bases.

Heteropsylla Crawford.

d^2. Media, cubitus, and radius of forewing forking from basal vein at same point (as in Triozinæ); cubital vein unforked at apex; hind wings nearly wanting..... Leptynoptera g. nov.

c^2. Forewings nearly or quite opaque, more or less coriaceous; veins greatly contorted; front tibiæ foliaceous..... Heteroneura g. nov.

a^2. Genæ swollen beneath into two more or less conical processes, these usually quite separated at base.

b^1. First marginal cell of forewing long and narrow with Cu_1 more or less parallel with margin of wing..... Paurocephala Crawford.

b^2. First marginal cell of forewing not long and narrow, Cu_1 not parallel with margin.

c^1. Body large; radial sector and media connected by a cross vein; first marginal cell small, much smaller than second.

Phacopteron Buckton.

c^2. Body small; cross vein wanting; first marginal cell very large, much larger than second; genal cones in some species scarcely discernible..... Calophya Loew.

Genus PAUROPSYLLA Rübsaamen

*Key to the species.**

a^1. Forewing with pterostigma.

b^1. Antennæ with two or more very long setæ at tip.

c^1. Antennæ much shorter than width of vertex between eyes; vertex showing median suture distinctly.

d^1. Antennæ with eight long setæ, tassellike. (Malay Archipelago.) P. brevicornis sp. nov.

d^2. Antennæ with two long setæ, not tassellike. (Bengal.) P. nigra sp. nov.

c^2. Antennæ about as long as width of vertex between eyes, with three long setæ; vertex with median suture not visible. (Malay Archipelago.) ..... P. verticis sp. nov.

b^2. Antennæ without long terminal setæ.

c^1. Forewing broadly rounded, marginal cells moderately large, pterostigma narrow; insect of medium size. (Ceylon.) P. spondiasæ Crawford ('15: 260).

c^2. Forewing acute at apex, broad, marginal cells very large, pterostigma elliptical, broad; insect large. Malay Archipelago; Hawaii?) ..... P. apsylloides sp. nov.

a^2. Forewings without pterostigma.

b^1. Second marginal cell much larger than first; fourth furcal (M_{1+2}) angulately arched and touching radius.

c^1. Insect minute, about 2 millimeters long from head to tip of folded wings; forewings with black spots scattered along veins; first marginal cell about one-third as large as second. (Ceylon.) P. floccosa Crawford ('15: 259).

c^2. Insect larger, 3 millimeters long or longer; forewing veins without black dots; first marginal cell about one-tenth as large as second. (Bengal.) ..... P. tuberculata Crawford ('12: 430).

b^2. Second marginal cell not larger than first, usually subequal; fourth furcal not touching radius.

c^1. Media and cubitus without stem, the radius, media, and cubitus forking from basal vein at same point (as in *Trioza*). (Philippines and Java.) ..... P. triozoptera Crawford ('13: 296).

c^2. Media and cubitus with a short stem, not as above.

d^1. Head and thorax black, reticulately marked; anterior ocellus above, near posterior ocelli; abdomen large, not flattened. (Philippines and Java.) ..... P. udei Rübsaamen ('99: 264).

d^2. Head and thorax reddish or light brown, reticulation indistinct; anterior ocellus in front, more distant from posterior ocelli. (Bengal.) ..... P. depressa Crawford ('12: 429).

Pauropsylla brevicornis sp. nov. Plate I, figs. 1 and 2.

Length of body, 1.3 millimeters; length of forewing, 1.9. General color reddish to chocolate brown, with venter of

* Because of lack of knowledge concerning them I have not included in this key *Pauropsylla ficicola* Kieffer and *P. globuli* Kieffer.

abdomen and metathorax whitish or pale greenish yellow; legs and antennæ yellowish or pale; wings membranous, clear. Body small, but robust.

Head small, much deflexed, appearing very short from dorsal aspect, not as broad as thorax; vertex roundly convex from frontal view, without prominent foveal impressions, slightly elevated at posterior ocelli; anterior ocellus visible from front, at lower margin of vertex; frons not visible; genæ mostly concealed by retraction of head toward thorax; clypeus and beak small. Eyes small. Antennæ very short, not half as long as width of head, with several very long, slender setæ giving the antennæ a tassellike appearance.

Thorax short and well arched. Legs short, small and slender, spines very inconspicuous. Forewings broad and rounded at apex, veins slender and not prominent.

Male: Genital segment small, short; forceps nearly as long as anal valve, very slender, tapering to acute apex, somewhat bent forward in apical third; anal valve broadest at base, converging to narrow apex. Female: Genital segment not quite as long as rest of abdomen, dorsal valve a little larger than ventral, truncate at apex.

TENIMBER ISLANDS, Larat (*Muir*), 1 male and 2 females.

Pauropsylla nigra sp. nov.

Length of body, 1.2 millimeters; forewing, 1.6. General color shining black; vertex and thorax dorsad glossy black, abdomen black above and below with connective membrane orange yellow. Genæ orange ventrad, thoracic venter orange in part and the rest black; antennæ yellowish; legs yellowish except hind femora, which are mostly black.

Structurally very similar to *Pauropsylla brevicornis*, differing in the following characteristics: Antennæ about one-third as long as width of head, with only two long setæ, these both at the tip and as long as the antennæ. Forewings shaped and veined much as in the related species but a little smaller.

Female genitalia similar but with a pair of small projections from caudal end between dorsal and ventral valves.

INDIA, Pusa, Bihar (*C. S. Misra*), September 5, 1914, 1 female, found in the laboratory.

Pauropsylla verticis sp. nov. Plate I, figs. 3 and 4.

Length of body, 2.3 millimeters, forewing 2.5. General color

light brown with darker streaks on dorsum; venter of thorax pale whitish with a few brown streaks; abdomen mostly dark brown; antennæ and legs light yellowish brown; wings clear.

Head strongly declivous, not as broad as thorax. Vertex somewhat quadrate in outline, nearly perpendicular to axis of body, nearly as long as broad, median suture not visible, surface without depressions, broadly convex and not flat, front portion extended forward between antennal bases. Frons small, visible from in front. Genæ slightly swollen beneath antennal sockets. Antennæ short, about as long as width of vertex between eyes, with three long setæ at end of each. Eyes large, recessive.

Thorax broad, well arched. Legs rather slender; hind tibiæ without basal spur. Forewings hyaline, clear, narrowly rounded at apex, veins narrow, yellow; pterostigma narrow, radius short; first marginal cell (in both forewings of the only specimen at hand) divided transversely across the middle.

Female genital segment nearly as long as abdomen, rather slender, dorsal valve a little longer than ventral, with a serrated carina along apical dorsal portion; both valves acutely pointed.

TENIMBER ISLANDS, Larat (*Muir*), 1 female.

This species is remarkable because of its vertex, which is without a visible median suture. The divided marginal cell of forewing is probably not a constant specific character but only an abnormality.

Pauropsylla apsylloides sp. nov. Plate I, fig. 7.

Length of body, 2.9 millimeters; forewing, 4.2. General color light to dark brown, sometimes with dirty brown blotches on thoracic dorsum; eyes dark; forewing clear, with four brown spots on posterior margin and one at apical end of pterostigma. Body large and robust; surface reticulately marked.

Head strongly declivous, not quite as broad as thorax. Vertex nearly perpendicular to axis of body, about three times as broad as length down median suture, arcuately concave on posterior margin; frons visible between genæ, with large front ocellus at apex; clypeus large, visible below frons. Genæ swollen beneath antennal sockets. Antennæ about as long as width of vertex between eyes, sometimes a little longer, relatively thick, segments short and terminal setæ rather short. Eyes large, recessive over propleurites.

Thorax very broad and robust, strongly arched, and finely reticulately marked. Legs short and thick; hind tibiæ short, without basal spur, four thick, black spines at apex within.

Forewings very large and broad, hyaline, clear, acutely pointed, veins slender; marginal cells very large; pterostigma elliptical, radius short.

Abdomen thick and short. Male genital segment short; forceps as long as anal valve, slender, not much bowed outward, tip slightly enlarged and provided with a short, downwardly and inwardly directed point. Anal valve slender, apical third inclined caudad and tubular in shape. Female genital segment longer than abdomen, much narrower and acuminate, dorsal valve a little longer than ventral and both acutely pointed.

TENIMBER ISLANDS, Larat (*Muir*), 1 female. BORNEO, Sandakan (*Baker*), 1 male. SOUTHERN CHINA, Macao (*Muir*), 1 female. HAWAII, Oahu (*A. Koebele*), 1 imperfect specimen apparently of this species. The last was no doubt an immigrant, perhaps taken on some recently imported plant. It appears not to have become established on this island as it has not been again taken in subsequent collecting during many years.

The male specimen differs from the others in being darker colored and in having the antennæ nearly as long as width of head including the eyes, the basal tarsus of hind legs a little longer, and the cubital petiole (M + Cu) longer than the stem of the cubital vein, while in the females it is shorter. Whether or not these are specific differences can scarcely be determined until examples of both sexes from each locality are available for study.

This insect is somewhat suggestive of *Apsylla cistellata*, an Indian species, but seems to be closer to *Pauropsylla* than to *Apsylla*.

Pauropsylla udei Rübsaamen.

Pauropsylla udei RÜBSAAMEN, Ent. Nachrichten 25 (1899) 262–266.
Pauropsylla bakeri CRAWFORD, Philip. Journ. Sci. § D 10 (1915) 258.

Length of body, 2 millimeters; length of forewing, 2.6; length of antennæ, 1. General color dark reddish to chocolate brown; antennæ, legs, ventral portion of genæ, and genital segment orange yellow or paler; eyes pale; wings clear. Body robust.

Head short, deflexed, not as broad as thorax; vertex reticulately marked, elevated at posterior ocelli, extending forward between antennal bases and covering frons, inclosing anterior ocellus so that latter appears to be on vertex; frons scarcely visible; genæ swollen beneath antennal bases, without cones; clypeus small. Eyes rather large; front ocellus near posterior ocelli and visible from above. Antennæ a little longer than width of head, slender.

Thorax very broad, arched, robust, surface finely reticulately marked. Legs slender; hind legs long. Forewings very broad distally, more than half as broad as long, clear, very thin and delicate; veins slender; marginal cells small.

Abdomen moderately large. Male genital segment small; forceps simple, nearly one-half as wide (lateral view) as long, roundly acute at apex, arched; anal valve about one-half longer than forceps, simple, truncate at apex. Female genital segment about one-third as long as abdomen; valves about equal in length, acutely pointed at apex.

JAVA, Salatiga (*Leeuwen-Reijnvaan*), April 5, 1912, on *Ficus variegata* Blume, 6 males and 10 females. These psyllids produce galls resembling those of cecidomyid flies.

Type locality.—SUMATRA (*Ude*).

Distribution.—LUZON, Laguna Province, Mount Maquiling (*Baker*). JAVA, Salatiga (*Leeuwen-Reijnvaan*), April 5, 1912.

The type specimens were taken from galls on an undetermined plant said to belong to the family Rubiaceæ. The galls were subspherical, flattened below at attachment to leaf, covered with thickly set, unbranched spines and opening after the maturity of the insect into a flowerlike shape by the splitting and spreading of sectors of the spherical gall.

Pauropsylla triozoptera Crawford ('13: 296).

Type locality.—Los Baños, Luzon, Philippines.

Several specimens, apparently belonging to this species but with slightly larger and more broadly rounded wings and larger body with longer legs, were taken in JAVA, Sindaglaija (*Muir*), 1 male and 4 females. LUZON, Benguet, Baguio (*Baker*), 1 male, also larger than the type specimens.

The differences between the Philippine and Javanese forms are slight and such as might naturally develop from isolation and separation.

Pauropsylla triozoptera setifera Crawford ('13: 297).

By some error in the manuscript, this variety was incorrectly placed with *Pauropsylla triozoptera* instead of with *Paurocephala psylloptera*. The specimens bear the correct label, but somehow the transfer in the manuscript was made. This error should be corrected to read *Paurocephala psylloptera setifera* Crawford.

Pauropsylla tuberculata Crawford ('12: 430).

One mutilated specimen appears to be very close to this Indian species. One forewing is intact and most of the other, but

the head and abdomen including the genitalia are mutilated beyond recognition of characters. The venation is very similar but not quite identical. In the Indian species the medial vein forks just about midway between the cubitus and radius, while in the Pacific form the furcation of the media is nearer to the radius. It is possible that an unmutilated specimen would show other differences of specific value.

TENIMBER ISLANDS, Larat (*Muir*), 1 specimen of somewhat doubtful identity, tentatively included here.

Genus LEPTYNOPTERA novum

Head deflexed, rather short, vertex broader than long, anterior angles typically produced over base of antennæ; genæ scarcely produced into cones; frons not covered by genæ. Antennæ rather short, second segment not barrel-shaped but produced distally on lower side. Thorax well arched. Legs long. Forewings membranous, broad distad, cubital petiole and first marginal cell both wanting, the cubitus reaching margin unforked. Hind wings nearly wanting, exceedingly short.

Type of the genus, *Leptynoptera sulfurea* sp. nov.

The position of this genus is a little doubtful, since it bears similarities to both *Trioza* and *Pauropsylla*. The shape of head, exposure of frons, shape of forewing, and some venational characters indicate a closer relationship to *Pauropsylla* than to *Trioza*. The absence of cubital petiole appears to be not exclusively a character of Triozinæ, as several unmistakable examples indicate. The unforked cubitus is a characteristic approached more or less closely by several species of *Pauropsylla*, suggesting that that vein of the forewing is subject to considerable variation. On the other hand, the same vein in Triozinæ appears to be more constant than many other characters of the body. The aborted hind wings are characteristic not only of this genus but also of a few species of *Trioza*, and to a lesser degree of species of *Pauropsylla* and several other specialized genera. There appears to be a more or less wide tendency in the entire family toward reduction of the hind wings in function, strength, and size.

Leptynoptera sulfurea sp. nov. Plate I, figs. 5 and 6.

Length of body, 1.7 millimeters; forewing, 2.6. General color bright sulphur yellow, with four narrow, inconspicuous, brown stripes on mesonotum; abdominal tergites with white transverse bands; eyes pale whitish; legs pale, femora whitish; antennal segments 1 and 2 yellow, remainder whitish with three black

bands, one at end of segment 4, another at tip, and another midway between; forewings clear except brown in anterior basal cell.

Head not as brown as thorax, strongly declivous, with long, sparse pubescence; vertex a little more than half as long as broad, anterior portion bent downward, posterior ocelli elevated, with a rather deep foveal impression on each side of median line, anterior outer corners produced into a short, upturned epiphysis over each antennal base. Genæ a little swollen beneath antennal sockets, bulging slightly forward of vertex. Frons wholly visible, broadest at base; clypeus moderately small; rostrum short. Antennæ a little longer than width of head, banded black and white, second segment with one side of apex produced.

Thorax broad, strongly arched, sparsely clothed with long hairs, mesonotum very short, transverse; pseudonotum (behind metanotum) large, long, with a pair of slender, upturned, whitish horns between this and basal segment of abdomen. Legs long, hind tibiæ long, with a very small basal spur and short distal spines. Forewings somewhat rectangular, hyaline, veins narrow, pterostigma wanting, radius not straight, cubitus unforked. Hind wings reaching about to primary fork of basal vein, veins practically wanting.

Abdomen short (genitalia mutilated).

MOLUCCAS, Amboina (*Muir*), 1 example.

Genus **PAUROCEPHALA** Crawford

Key to the species.

a^1. Forewing with pterostigma; vertex rounded forward and down; head strongly deflexed.

b^1. Metascutellum with a conical, usually acutely pointed, epiphysis dorsad; female genital segment usually deflexed at right angles to abdomen.

c^1. Antennæ distinctly longer than width of head; posterior ocelli prominently elevated; tip of female genitalia straight.

d^1. Body surface and wing veins not hairy or with only very inconspicuous pubescence. (Philippines, Ceylon, and Malay Archipelago.) ..... P. psylloptera Crawford ('13: 294).

d^2. Body surface and wing veins conspicously hairy. (Philippines, Fiji, and Singapore.).... P. psylloptera setifera Crawford ('13: 297).

c^2. Antennæ not longer than width of head, usually not as long, posterior ocelli not much elevated; tip of female genitalia curved outward.

d^1. Antennæ about as long as width of head with eyes; forewing with three dark spots on costal margin; insect very small. (Philippines.) ..... P. minuta sp. nov.

d^2. Antennæ shorter, about as long as head between eyes; forewings with five or six marginal spots; insect a little larger. (Philippines.) ..... P. brevicephala Crawford ('17: 163).

b^6. Metascutellum without conical epiphysis; female genital segment typically horizontal.

c^1. Frons large and prominent, not covered by genæ; forewings converging in distal half to apex; genæ swollen subconically beneath antennal bases.

d^1. Forewings narrowly rounded at apex; hyaline; frons very large. (Southern Mexico.) ..... P. magnifrons Crawford ('14: 42).

d^2. Forewings subacute at apex, not hyaline and often nearly opaque; frons smaller. (Malay Archipelago.) ..... P. conigera sp. nov.

c^2. Frons smaller, mostly covered by genæ; forewings not converging, broadly rounded; genæ scarcely swollen beneath antennal bases. (Southeastern United States.)
P. ilicis (Ashmead) Crawford ('14: 43).

a^3. Forewing without pterostigma; vertex more flattened and head less deflexed.

b^1. Forewings conspicuously maculated; radius and medial veins sinuate. (Singapore.) ..... P. maculata sp. nov.

b^2. Forewings not maculated, clear; veins not sinuate. (Philippines.)
P. orientalis Crawford ('15: 261).

Paurocephala psylloptera Crawford.

This appears to be a common species, widely distributed in the South Pacific regions. Since additional material has come to hand it seems necessary to supplement the original description which was drawn up from six specimens. The color of the male is not uniformly darker than the female; both sexes are usually very dark chocolate brown to dull black; lighter forms seem to be less matured, the color deepening with age; vertex and thoracic dorsum sometimes with orange yellow streaks but more commonly uniformly dark, antennæ usually as dark as vertex; legs often lighter in color or even yellowish. Body surface often not hairy; vertex and thoracic dorsum finely, reticulately marked. The beak is moderately long and the mandibular setæ sometimes exserted to a length of 1 millimeter or less. The hind tibiæ have a row of about seven black spines on outside, several spines at apex and are more or less hirsute. The metacoxal spurs are long and slender. Pterostigma of forewings usually dark colored, veins black.

In the Philippine Islands this species has been collected in LUZON, Los Baños (*Baker*), on *Ficus ulmifolia;* and on Mount Maquiling (*Baker*). CEYLON, Peradeniya (*Rutherford*), on *Ficus hispida* and *Ficus asperrima.* Additional specimens are now before me from TENIMBER ISLANDS, Larat (*Muir*), December, 1907, 18 males and 18 females.

Paurocephala psylloptera setifera Crawford.

Pauropsylla triozoptera setifera CRAWFORD, Philip. Journ. Sci. § D 8 (1913) 297.

Several specimens from Fiji Islands appear to belong to this variety. The color is uniformly a little darker than the average of the Philippine forms, but the markings on vertex and notum are similar and the antennæ are similarly colored, darker at tips of segments 3 to 8. The body surface is a little less hirsute than in the Philippine forms. By a mechanical error this variety was originally placed with the wrong species.

FIJI ISLANDS (*Muir*), 2 males and 3 females, 1905. SINGAPORE (*Baker*), 1 male. The specimen from Singapore differs from the type of the variety in being orange yellow with some darker streaks on notum. The body surface and wing veins are less hirsute, but the male genitalia are quite similar.

Paurocephala brevicephala Crawford.

Pauropsylla brevicephala CRAWFORD, Philip. Journ. Sci. § D 10 (1917) 163, pl. 1, fig. 11.

This Philippine species was misplaced in the genus *Pauropsylla*. The wing venation, form of vertex and presence of the metascutellum epiphysis point to its close affinity with species of *Paurocephala*. A few additions to the original description are here made.

Vertex not prominently elevated at posterior ocelli, without foveal impressions. Surface of vertex and dorsum finely reticulately marked. Metascutellum produced upward into a thick epiphysis with a very small, acute point. Hind legs longer than others, but relatively shorter than in some other species of the genus. Female genital segment turned downward, with tip of dorsal valve curved outward, acute. The shortness of the antennæ is an unusual character in this genus.

MINDANAO, Davao (*Baker*), 3 females.

Paurocephala minuta sp. nov. Plate I, fig. 8.

Length of body, female, 0.9 millimeter; length of forewing, 1.4. General color brown to dark brown, with legs, venter, and antennæ lighter or pale; a whitish or pale spot on thorax at base of each forewing. Body small.

Resembling *P. psylloptera* in many characteristics, and apparently closely related to that species. Vertex relatively broader and with foveal impressions and postocellar elevations less prominent. Antennæ short, scarcely as long as width of

head. Thorax well arched, broad; metascutellum with a large, blunt epiphysis; legs short; hind tibiæ relatively shorter than in related species, with fewer spines; forewings small, similar in shape to related species, but pterostigma relatively longer and narrower and less-dark colored; three dark spots on costal margin, one at base of pterostigma, another at tip of same, and a third at tip of radius.

Female genital segment deflexed but shorter than in *P. psyllaptera*, tip of both valves very acute and flexed outward.

LUZON, Laguna Province, Los Baños (*Baker*), 1 female.

Paurocephala maculata sp. nov. Plate I, fig. 9.

Length of body, 1.2 millimeters; length of forewing, 1.4. General color reddish brown, more or less glossy, smooth, venter of thorax and abdomen tawny, femora orange, tibiæ darker; antennal segments 1 and 2 reddish, 3 to 8 white or pale, 9 and 10 black or brown; forewings beautifully maculated, mostly brownish with several large clear areas and numerous, minute, dark spots in the brown.

Head short, nearly as broad as thorax, deflexed, vertex smooth and shining, without prominent depressions or elevations, rounded downward in front sharply, anterior ocellus visible from front only; frons visible from in front and below, small; genæ swollen beneath antennal bases, making an emargination in which the clypeus is visible. Antennæ a little longer than width of head, segment divisions not distinct.

Thorax arched, broad, dorsal surface smooth and glossy except a large elevated callus on each side of dorsulum (mesoscutum) rough and lighter red in color; metascutellum with a long, low elevation along median line. Legs short. Forewings a little longer than body, broadly rounded at apex, conspicuously maculated; radius and media sinuate; pterostigma wanting, first marginal cell long and narrow.

Female genital segment moderately large, not deflexed, dorsal valve a little longer than ventral, acutely pointed and tip flexed outward.

SINGAPORE (*Baker*), 1 female.

This species is somewhat different from the type of *Paurocephala* (in the absence of pterostigma and the sinuate veins), but provisionally, at least, it is included in this genus.

Paurocephala conigera sp. nov. Plate I, fig. 10.

Length of body, 2.7 millimeters; forewing, 4. General color orange to yellowish brown or brown; venter and legs a little

lighter in color; antennæ dark distad; forewings semitransparent, usually brownish or sometimes brown and opaque.

Head strongly declivous, fully as broad as thorax. Vertex a little more than half as long as broad, subperpendicular to axis of body, with a shallow sulcus across posterior portion, surface somewhat convex. Frons visible in front, with large ocellus. Genæ swollen beneath antennal bases into subconical processes very broad at base, subacutely pointed and about one-third as long as vertex. Antennæ a little less than twice as long as width of head, slender.

Thorax not strongly arched. Legs rather short, hind tibiæ with a small spur at base. Forewings long and narrow, subacute at apex, membrane thick, semitransparent or often opaque because of the brown color.

Abdomen long. Male forceps slender, little more than half as long as anal valve, acutely pointed; anal valve long and rather slender, tapering from base to subacute apex. Female genital segment about half as long as abdomen, dorsal valve with a large, rounded convexity dorsad, acutely pointed, a little longer than ventral valve.

MOLUCCAS, Amboina (*Muir*), 1 male and 3 females.

This resembles *P. magnifrons*, a tropical American species, more closely than other species of this genus. Quite possibly these two species should be referred to a distinct genus.

Genus HETERONEURA novum

Head somewhat as in *Pauropsylla*, much deflexed and short; vertex roundly convex; frons inferior, with anterior ocellus visible only from in front; genæ small, not much swollen, cones wanting; eyes rather small; beak short; antennæ as long as width of head or longer.

Thorax well arched; legs short, front tibiæ flattened, thin and foliaceous; hind tibiæ with a tooth near apex; metacoxal spurs short. Forewings coriaceous, opaque, broad; marginal cells long and narrow as in *Paurocephala;* second marginal cell flexed toward costal margin; radius contorted; pterostigma closed.

Type of the genus, *Heteroneura oceanica* sp. nov.

This genus appears to belong to the subfamily Pauropsyllinæ, but differs from other genera of this subfamily in the coriaceous forewings, the much contorted radius, and the foliaceous front tibiæ.

Heteroneura oceanica sp. nov. Plate I, fig. 11.

Length of body, 1.8 millimeters; length of forewing, 2; length of antennæ, 1.2. General color dark brown; meso- and meta-

scutellum dirty white or yellowish; antennal segments 3 to 8 dark at apex and light basally, 9 and 10 black; forewings opaque, brown, small area at base and another at tip whitish, veins tawny; between the veins rows of many, small, light-colored patches, giving a very striking and characteristic appearance to the wings. Body surface sparsely covered with rather long hairs.

Head short, not as broad as thorax, much deflexed, hairy; vertex roundly convex, without foveal impressions, scarcely elevated at posterior ocelli; frons scarcely visible; front ocellus not visible from above, close to clypeus; genæ small, somewhat swollen beneath each antennal insertion, without cones. Antennæ twice as long as width of head, slender.

Thorax broad, robust, hairy. Legs rather short; front and middle pairs of tibiæ conspicuously flattened and somewhat foliaceous and front femora somewhat flattened in distal half; hind tibiæ with a large, prominent tooth near apex. Forewings coriaceous, not flat but somewhat convex, broadly rounded at apex; venation very singular and characteristic; pterostigma shaped like a marginal cell; radius much contorted, second marginal cell long and narrow and parallel with posterior and apical margins of wing.

Abdomen about as long as thorax. Female genital segment short, about one-fourth as long as abdomen; dorsal valve a little longer than ventral, both slender and acute at tip, dorsal valve with an acute epiphysis at apex.

SINGAPORE (*Baker*), 1 female. LUZON, Bataan Province, Mount Limay (*Baker*), 1 female. BASILAN (*Baker*), 1 female.

Genus HETEROPSYLLA Crawford

This American genus, comprising seven described species, is a well-marked group. One species apparently abundant in the South Pacific is closer to this genus than any other. Although it differs in some important characteristics from the American species, it is nevertheless included herein for the present.

Heteropsylla longicornis sp. nov. Plate I, fig. 12.

Length of body, 2 millimeters; length of forewing, 2.1; length of antennæ, 4. General color light to dark reddish brown; tibiæ, tarsi, metapleuræ, and a small area beneath each eye pale; several streaks on thoracic dorsum white or pale; two longitudinal rows of white spots on each side of abdomen. Body surface pubescent.

Head nearly as broad as thorax, short, deflexed; vertex broad,

triangular on each side of median line with long side next to eye, prominently elevated at posterior ocelli, with median suture conspicuous and convex between antennal sockets and median suture, with an elongate sulcus distally on each side of median line; anterior ocellus scarcely visible from above; frons mostly covered by genæ; genæ very expansive, but not swollen, continuing to clypeus in nearly the same plane with distal portion of vertex. Clypeus moderately large, beak very long and prominent. Eyes very large. Antennæ one and a half to two times as long as body without wings, very slender and threadlike, darker apically.

Thorax broad, well arched; propleurites covered by recessive eyes, metascutellum elevated into a large, prominent epiphysis. Legs large, hairy; hind tibiæ with spur at base and several spines at apex; basal tarsus of third leg with two black spines at apex. Forewings membranous, clear, with several (usually six) black or brown spots along posterior and apical margins; veins setiferous.

Abdomen somewhat laterally compressed dorsad, and more or less triangular in transverse section, sharply angled above; each segment with a dense fringe of hairs on posterior margin. Male genital segment not large; forceps not quite as long as anal valve, nearly as broad; anal valve long and slender, inclined toward forceps, truncate at apex. Female genital segment about half as long as abdomen, both valves subequal in length, acute, hairy.

TENIMBER ISLANDS, Larat (*Muir*), December, 1907, 57 males and females. MOLUCCAS, Amboina (*Muir*), January, 1908, 1 male and 12 females.

This differs from the other species of the genus in the larger size, longer antennæ, armed hind tibiæ, and epiphysis on metascutellum. The other species are American. An imperfectly preserved specimen from the Philippines seems to belong to this genus.

Phacopteron lentiginosum Buckton.

Phacopteron lentiginosum CRAWFORD, Rec. Indian Mus. 7 (1912) 420, pl. 33, figs. A, B, F; pl. 35, fig. A.

Nymph.—The nymph of this species is very large and robust, not flattened as in most psyllids but more cylindrical or saccate, the shape characteristic of most gall-forming species. Head very short, much narrower than thorax; eyes not bulging, small; antennæ about as long as width of head, stout; clypeus large and prominent. Thorax nearly as broad as abdomen, legs short

and stout. Abdomen large, the broadest part of body broadly rounded caudad.

Four adult specimens and three nymphs of this large and striking psyllid are before me, collected in Pollibetta, Coorg, India, on May 27, 1914, from galls on leaves of an unidentified tree.

CARSIDARINÆ

This subfamily has much larger representation in tropical countries, only a few species being found as far north as the southern United States. Previous to 1911 so few representatives of this subfamily had been discovered and examined that those few were assigned positions in genera variously related to the other Psyllidæ; but when an increasingly large number of forms from many tropical localities began to come to hand, it became apparent that a comparatively large tropical fauna of this type existed.

As our knowledge of this group advances we shall no doubt have to recast our taxonomic conceptions. One of the most striking peculiarities of the representatives first examined was the deeply cleft head, with the thickened antennæ enhancing the cleft appearance, and the absence of genal cones. Examination of more species of this subfamily, however, has shown that these characteristics are not to be found throughout the subfamily, though the genal cones usually are absent. The body always has a characteristic elongate form, and the wings have a peculiar venation; though this latter peculiarity is one not easily explained nor easily appreciated by one unfamiliar with the group.

As the tropical countries of the world are more carefully explored for their insect life, it is probable that many new and perhaps quite different types of this subfamily will be brought to light, necessitating changes in our taxonomic disposition of these very interesting little creatures.

The following subfamily description is intended to supersede the previous definitions of this group:

Body typically elongate, often slender. Head usually cleft in front, vertex more or less concave on front margin and genæ swollen out forward beyond vertex at each antennal base, and the latter often swollen and increasing the birostrate appearance of the head, but in at least two genera, *Nesiope* and *Tenaphalara*, head not birostrate. Genal cones usually wanting or very small and inconspicuous. Beak very long. Eyes hemispherical, usually not at all recessive. Antennæ usually long, often thick-

ened and sometimes very hairy. Thorax not strongly arched. Hind tibiæ usually with a spur at base and spines at apex; basal tarsus of hind legs usually with one black claw (two in *Homotoma,* but the relationships of this genus are not clear). Forewings always membranous and hyaline, usually more or less acutely pointed, often with a veinlike callus or two connecting veins distad. There is a scarcely definable, characteristic manner of branching of medial and cubital veins.

Although I have seen no representatives of certain Autralian genera, the illustrations and descriptions of these point to an affinity with Carsidarinæ so clearly that they have been included here, tentatively. *Homotoma* is an old genus and still of very doubtful relationship. The presence of two claws on the basal tarsus of the hind legs is distinctly a characteristic—and apparently an important one—of Psyllinæ and not of Carsidarinæ. The genæ, also, often are produced into distinct cones. It is possible that the genus should be referred to another subfamily, but for the present at least it may be retained here.

Key to the genera.

a^1. Cubitus and media with common stalk (cubital petiole).

b^1. Antennæ thick throughout, not longer than body to tip of abdomen.

c^1. Antennæ thickly hirsute and often carinate; genæ usually with conical processes directed downward on each side of clypeus. **Homotoma** Guerin.

c^2. Antennæ not hirsute, nor carinate, but terete; genæ not produced into cones..... **Epicarsa** Crawford.

b^2. Antennæ slender at least beyond third segment, usually distinctly longer than body (except in *Macrohomotoma*), not hirsute.

c^1. Head birostrate in appearance, by the projection forward of genæ on each side of midline and attachment of antennæ at end of projecting genæ.

d^1. Outer anterior angles of vertex elevated above genæ, more or less hornlike; insect usually very large.

e^1. Female genitalia with ventral valve nearly as long as dorsal, latter without thick fringe of hairs; vertex produced into a large horn over each antennal socket; hind tibiæ without basal spur, with very large spines at apex; first antennal segment very long; forewing with marginal cells nearly equal in size..... **Dynopsylla** Crawford.

e^2. Female genitalia with ventral valve very short, dorsal valve many times larger and very thickly fringed with stiff hairs along ventral margin, vertex sharply angled but not produced into horns in front; hind tibiæ with basal spur; first marginal cell of forewing much smaller than second. **Thysanogyna g. nov.**

d^2. Vertex not as above.

e^1. Forewings with pterostigma, hind tibiæ usually with basal spur; antennæ very long and slender.

f^1. Transverse callus connecting radius and media; hind tibiæ with spur at base; pterostigma open or closed.
Carsidara Walker.
f^2. Transverse callus in forewing wanting.. Mycopsylla Froggatt.
e^2. Forewings without pterostigma; hind tibiæ with or without basal spur.
f^1. Antennæ long and very slender.
g^1. Vertex produced in front into two long points (not genal cones); hind tibiæ without basal spur.
Geijerolyma Froggatt.
g^2. Vertex not so produced, but more or less deeply cleft in front; hind tibiæ with basal spur.
Tyora Walker (*Mesohomotoma* Kuwayama).
f^2. Antennæ long but not slender, vertex deeply cleft in front.
Freysuila Aleman.
f^3. Antennæ very short and slender; vertex not deeply cleft in front ..... Macrohomotoma Kuwayama.
c^2. Head not birostrate, vertex more or less quadrate.
d^1. Margins of vertex turned up in a narrow rim; female genital segment long and acuminate..... Nesiope Kirkaldy.
d^2. Margins of vertex not turned up, but vertex usually inclined roundly forward and downward; female genital segment with dorsal valve constricted subapically.... Tenaphalara Kuwayama.
a^2. Cubitus and media without stalk (triozine).
b^1. Antennæ thick and hairy; genæ sometimes swollen beneath into more or less conical processes..... Bactericera Puton.
b^2. Antennæ slender and not hairy; genæ without cones beneath.
c^1. Head more or less birostrate (as in *Carsidara*).... Rhinopsylla Riley.
c^2. Head not at all birostrate; vertex nearly quadrate, declivous.
Tenaphalara triozipennis Crawford.

Genus **THYSANOGYNA** novum

Head cleft in front as in other genera of this subfamily; genal cones almost or quite wanting; vertex more or less quadrate, concave, outer anterior corners sharply angled and elevated, with anterior ocellus in front at notch of frontal cleft; antennæ slender except segments 1 and 2, not excessively long; beak moderately long.

Thorax large; legs large; hind tibiæ with spur at base and large spines at apex; basal tarsus of hind legs with one black spine at apex. Forewings large, with closed pterostigma, short radius and indistinct pseudovein between radius and media; first marginal cell much smaller than second.

Abdomen large; female genitalia somewhat dissimilar from other genera; dorsal valve large, with a dense fringe of hairs on lower margin; ventral valve very small and often retracted into preceding abdominal segment; ovipositor large, broadly truncate, edges fluted.

Type of the genus, *Thysanogyna minor* Crawford.

This species was first described from a single male as belonging to *Dynopsylla,* but some characters were noted in which the species did not conform to the generic type. Subsequently many other specimens of this species have come to hand and among them females. The genitalia of the female at once show a marked difference not only from *Dynopsylla* but from most other genera. This species, therefore, is designated the type of a new genus, which appears to be related to other genera of Carsidarinæ. Since the first description did not include the female and was somewhat inadequate in a few other respects, a more detailed specific description is given herewith to replace the other.

Thysanogyna minor Crawford. Plate II, figs. 2 and 4.

Dynopsylla minor CRAWFORD, Philip. Journ. Sci. § D 12 (1917) 263.

Length of body, 2.7 millimeters; length of forewing, 5; greatest width, 2.3. General color light brown with darker brown streaks on thoracic dorsum or the color may be dark brown with lighter streaks; antennæ with apical third or half of segments 3 to 8 and all of 9 and 10 black. Body surface more or less covered with white flocculent excretion. Insect large and robust.

Head about as broad as prothorax, but mesothorax considerably broader, not much deflexed, cleft in front. Vertex a little more than half as long as broad, deeply concave, the median suture prominent, and the two halves nearly quadrate, the outer anterior corner acute and upstanding, giving the appearance of a horn (somewhat as in *Dynopsylla*); anterior margin of vertex somewhat emarginate, the protruding genæ at base of antennæ much emphasizing this emargination. Anterior ocellus in front at base of cleft; frons visible as a small and narrow sclerite between genæ and below front ocellus. Genæ very large, protruding in front to form antennal bases, beneath the head and just in front of labrum produced into a pair of very small wartlike cones. Labrum not large; beak about as long as third antennal segment. Antennæ moderately long and slender, not as long as body but usually as long as head and thorax or a little longer.

Thorax very large, well arched and broad, sparsely hairy. Pronotum large; mesonotum very large; metanotum with a pair of short blunt horns or epiphyses caudad. Legs long and large; hind tibiæ with spur at base and several long fingerlike spines at apex; tarsi long. Forewings large and long, narrowly rounded at apex, transparent, with four small brown spots along poste-

rior margin and one in pterostigma; an indistinct pseudovein connecting radius and media, as in *Carsidara*.

Abdomen large. Male anal valve a little longer than forceps, broadest at middle; forceps somewhat fusiform, thick at middle, apically tapering to a narrow and truncate end. Female genital segment large; dorsal valve very large, with a small, curved, acute epiphysis caudad, and a large anal opening dorsad; the lower margin densely fringed with slender hairs, as a brush. Ventral valve very small and retracted more or less completely into preceding abdominal sclerite with an acute epiphysis at apex. Ovipositor large, very broadly truncate at apex, apparently permanently exserted, margin fluted.

LUZON, Laguna Province, Mount Maquiling (*Baker*), 1 female: Tayabas Province, Malinao (*Baker*), 2 females. TENIMBER ISLANDS, Larat (*Muir*), December, 1917, 5 males and 13 females.

Type locality.—LUZON, Laguna Province, Los Baños.

The Larat specimens very closely resemble those from the Philippines except in some very minor color characters and the following two wing characters: Forewing of Larat specimens a little less acute at apex, and radius shorter; in Philippine specimens the radius joins the margin at a point as far from tip of pterostigma as the length of latter; in Larat specimens the length of pterostigma is nearly twice the length from tip of radius to tip of pterostigma. This probably indicates the incipiency of another species.

Genus TYORA Walker

This genus is very close to *Carsidara*, differing chiefly in the absence of pterostigma in the forewing. Froggatt's *Tyora sterculiæ*, however, does possess the pterostigma. I am inclined to believe that *Tyora* should be merged with *Carsidara*, but until more material is available for comparison I am unwilling to make this change. *Tyora indica*, described below, is evidently very closely related to *T. hibisci* Froggatt but has no claw nor spine at apex of hind femora said to be present in both the Australian species of this genus.

Mesohomotoma Kuwayama is apparently very close to *Tyora*, differing in no essential character whatever, so far as I can discover, from Kuwayama's description. However, until I have examined a representative of the Japanese genus, I am loath to make any alteration.

Tyora indica sp. nov. Plate II, fig. 1.

Length of body, male, 2.4 millimeters; female, 3.3; length of forewing, male, 3.5; female, 4.7; length of antennæ, 1.9. Gen-

eral color orange yellow to yellowish green, dorsum of thorax sometimes with paler streaks or often white stripes in male; antennal segments 4 to 8 black at tip, 9 and 10 all black; wings clear with several small dark spots along margins. Body surface often covered with white flocculent material.

Head small, little broader than prothorax, not deflexed, deeply cleft in front, vertex with edges and median line elevated into a narrow rim with two deep fossæ extending from posterior margin slightly divergently toward antennal bases; in the male the lateral ridges and ridge on each side of median suture are often whitish; anterior outer angle of vertex acute and forming a small hornlike epiphysis over eye; anterior ocellus at front margin of vertex, a little above apex of frontal cleft and visible from above. Genæ not swollen into cones beneath, but projecting forward at antennal bases forming frontal cleft. Frons very narrow, scarcely visible between genæ. Antennæ a little more than half as long as body, slender. Beak moderately long.

Thorax not much arched, not broad. Legs rather short and slender; hind tibiæ with a small spur at base and several black spines at apex; basal tarsus of hind legs with one black spine at apex. Forewings hyaline, long, about two and three-fourths times as long as broad, with pseudovein connecting short radius and media; pterostigma wanting.

Male abdomen slender; genital segment small; forceps very slender, arched, acutely pointed; anal valve shorter than forceps, relatively very broad, expanded laterally. Female abdomen larger, broader; genital segment nearly as long as rest of abdomen; dorsal valve bulging upward and hirsute midway and abruptly constricted in apical third to an acute point; ventral valve tapering to an acute point, nearly as long as dorsal.

MOLUCCAS, Amboina (*Muir*), January, 1908, 5 males and 6 females. INDIA, Mercara, Coorg (*Y. R. Rao*), May 24, 1917, 3 females.

This species is very close to *Tyora hibisci* Froggatt, differing in some color characters and in the genitalia of both sexes. *Mesohomotoma camphoræ* Kuwayama is very similar to this species and apparently is not generically distinct.

Genus NESIOPE Kirkaldy

Nesiope KIRKALDY, Proc. Linn. Soc. N. S. W. 33 (1908) 389.
Carsidaroida CRAWFORD, Philip. Journ. Sci. § D 12 (1917), 165.

Nesiope and *Tenaphalara* differ sharply from the remainder of the subfamily in the shape of the head, which in these two genera is not at all cleft as it is in the others. Notwitstanding

this disparity there is undoubtedly a close relationship between these two and the others, as indicated by similarity of venational and certain other body characters, as the presence of but one claw on the basal tarsus of hind legs.

The close similarity between Kirkaldy's *Nesiope* and my *Carsidaroida* did not appear until the latter had been published, wherefore it becomes necessary to merge my genus with the other. The differences between the species are brought out in the following key:

Key to the species.

a^1. Thoracic dorsum conspicuously striped with black (or brown) and yellowish (or orange) longitudinal bands; length of insect more than 5 millimeters.

b^1. Forewings scarcely spotted, more or less fumate; insect large, usually over 7 millimeters long. (Philippines, Singapore, and Amboina.) ..... **N. heterocephala** Crawford ('17: 165).

b^2. Forewings conspicuously spotted in apical half with many small brown and large black spots. Insect about 5 millimeters long. (Larat and Java.) ..... **N. heterocephala intermedia** var. nov.

a^2. Thoracic dorsum not as above, but with "a central pale line down dorsulum and mesonotum very narrowly bordered with black; sides of mesonotum broadly ferruginous, with two pale, curved, very narrow lines;" forewings spotted with brown in apical half. (Fiji.) **N. ornata** Kirkaldy ('08: 389).

Nesiope heterocephala Crawford ('17: 165).

CELEBES and AMBOINA (*Muir*), 5 males and 3 females. SINGAPORE (*Baker*), 1 pair.

Type locality.—LUZON, Benguet, Baguio (*Baker*).

Nesiope heterocephala intermedia var. nov.

Similar to the species, except body of both sexes distinctly smaller and forewings with apical third or half dotted with numerous brown spots and several elongate, black spots. In some individuals of the species there is a slight spotting as in the variety, but this is not nearly so conspicuous. Genitalia of both sexes similar to the species but smaller. The maculation in this variety appears to be quite distinct from that of *N. ornata*, judging from Kirkaldy's description and figure of the latter.

TENIMBER ISLANDS, Larat (*Muir*), December, 1907, 4 males and 8 females. JAVA, Buitenzorg (*Muir*), 1 male.

Genus **HOMOTOMA** Guerin

Although this genus bears unmistakable resemblance to other genera of Carsidarinæ, its relationship is not wholly clear yet.

I attach a good deal of importance, taxonomically, to the clawlike spines on the basal tarsus of the hind legs. In Psyllinæ there are two such "claws," in Triozinæ none, while in Carsidarinæ there is one "claw." In *Homotoma*, however, there are usually two and in *Mycopsylla* there appear to be two. In some other respects, also, this is somewhat of an aberrant genus, but it is retained in this subfamily, for the present at least.

Key to the species.

a^1. First marginal cell much smaller than second or wanting; radius and media quite or nearly contiguous for a greater or less length; pterostigma wanting.

b^1. Medial vein contiguous with radius for about one-half length of latter, leaving an open cell between them on costal margin.

c^1. First marginal cell present; a black band following radius to margin and another following cubitus. (Formosa.)
H. radiatum Kuwayama ('08: 181).

c^2. First marginal cell wanting; the two black bands wanting, but radial vein prominently black. (Bengal.)
H. distincta Crawford ('12: 433).

b^2. Medial vein contiguous with radius for nearly or quite the entire length of latter, leaving no cell or only a very small one between them; a black band following radius and media, and a second one following cubitus; first marginal cell present but small.

c^1. Insect large, 6 millimeters long to tip of folded wings; antennæ terete, without carinæ; costal margin of forewing roundly arched, wing nearly half as broad as long. (Philippines and Straits Settlements.) ..... H. bakeri Crawford ('15: 263).

c^2. Insect smaller, about 3 millimeters long to tip of folded wings; antennæ carinate; costal margin of forewing much less arched, wing about one-third as broad as long. (Philippines.)
H. bilineata Crawford ('17: 164).

a^2. First marginal cell nearly as large as second; radius and media not contiguous; pterostigma present; wing veins margined with black; antennæ carinate. (Philippines.) .... H. pacifica Crawford ('15: 262).

Homotoma bakeri Crawford ('15: 263).

A single male has been taken by C. F. Baker on Penang Island, Straits Settlements. As the original description of this species was drawn up from a female example, the male genitalia are here described.

Male.—Forceps as long as anal valve or longer, basal half with a carina on outer face, distal half enlarged, somewhat spearhead-shaped with tip bluntly rounded. Anal valve very slender in distal half, base broader.

Hind wings in both sexes very small and almost nerveless.

Genus TENAPHALARA Kuwayama

Tenaphalara KUWAYAMA, Trans. Sapporo Nat. Hist. Soc. 2 (1908) 154.
Strogylocephala CRAWFORD, Philip. Journ. Sci. § D 12 (1917) 166.

Body elongate, slender; head not much deflexed, nearly or quite as broad as thorax; vertex more or less rounded forward and downward, with anterior ocellus at front end of head and antennæ inserted at end on each side of front ocellus; genæ not produced into cones, slightly swollen beneath antennal sockets, usually not wholly covering frons, antennæ slender; eyes hemispherical, not recessive.

Thorax slender, not arched; legs slender, often rather long. Forewings long and narrow, more or less acutely pointed; venation of Carsidarinæ type, with two pseudoveins or calluses; pterostigma present. Abdomen long and slender.

Type of the genus, *Tenaphalara acutipennis* Kuwayama.

This is rather an anomalous genus, suggestive of *Aphalara* and also *Pauropsylla* in the head shape, and of Carsidarinæ in wing venation, tarsi, and eyes. Kuwayama placed the genus at the end of his subfamily Aphalarinæ, but the majority of the characters point rather to an affinity with Carsidarinæ. Although the head is not cleft in front, as in *Carsidara*, nevertheless this genus is now referred to the subfamily Carsidarinæ. This is a tropical subfamily and many forms doubtless remain undiscovered. *Nesiope* appears to be intermediate between *Carsidara* with its deeply cleft head and *Tenaphalara* with its head not at all cleft in front.

Key to the species.

a^1. Vertex smooth and uniformly rounded forward and down to genæ, with antennæ slender and well separated at base.

b^1. Forewings with a longitudinal brown vitta; vertex very abruptly descending; insect dark colored, small, less than 3 millimeters long to tip of folded wings. (Philippines.)
T. fascipennis Crawford ('17: 167).

b^2. Forewings clear, without vitta; vertex less abruptly descending; insect greenish yellow, larger, at least 4 millimeters long to tip of folded wings. (Formosa, Philippines, and Bengal.)
T. acutipennis Kuwayama ('08: 155).

a^2. Vertex not smooth nor uniformly rounded forward and downward to genæ.

b^1. Vertex with a prominent epiphysis just behind each antennal base; posterior ocelli elevated; antennæ approximate at base.

c^1. Forewings with pterostigma; third antennal segment distinctly thicker than succeeding segments. (Malay Peninsula.)
T. malayensis sp. nov.

c^4. Forewings without pterostigma; third antennal segment not thickened. (Borneo.) ..... T. juliana sp. nov.

b^2. Vertex without epiphyses, with longitudinal dark stripes; ocelli not elevated; antennæ slender, not approximate at base.

c^1. Pseudo (cross) veins present in forewings; radius and mediocubitus not forking from basal vein at same point; vertex flattish, with four longitudinal dark stripes. (Malay Peninsula.) T. striata sp. nov.

c^3. Pseudo (cross) veins wanting: radius, media, and cubitus all forking from basal vein at the same point (as in Triozinæ); vertex more rounded, with three black stripes. (Malay Peninsula.) T. triozipennis sp. nov.

Tenaphalara acutipennis Kuwayama.

Tenaphalara acutipennis KUWAYAMA, Trans. Sapporo Nat. Hist. Soc. 2 (1908) 155.

Tenaphalara elongata CRAWFORD, Rec. Indian Mus. 7 (1912) 432, pl. 34, figs. M, N, P, Q; pl. 35, fig. O.

Length of body, 2.5 to 2.9 millimeters; forewing, 2.8 to 3.3. General color greenish yellow; dorsum sometimes with whitish longitudinal streaks; eyes brown; antennæ black at tip. Body long and slender.

Head not deflexed, not quite as broad as thorax, anterior end broadly rounded both horizontally and dorsoventrally. Vertex quadrate, a very little longer than broad, inclined downward somewhat roundly, without prominent foveal depressions. Genæ slightly swollen beneath antennal bases but not meeting over frons; frons visible between genæ; anterior ocellus at front end of head, at end of frons. Antennæ about two and one-half times as long as width of head, slender.

Thorax narrow, not arched, pronotum long; dorsulum short. Legs slender, rather long; hind tibiæ with spur at base and three large, black spines at apex. Forewings long and slender, three times as long as broad, hyaline, transparent, sometimes slightly flavous, acute at apex, with pseudovein between radius and radial sector and another between radial sector and media.

Abdomen long and slender, tapering to narrow apex. Male forceps nearly as long as anal valve, slender, arched, roundly acute at apex; anal valve broadest in basal third, tapering to apex. Female genital segment about one-fourth as long as abdomen; dorsal valve longer than ventral, somewhat enlarged at tip, ventral valve acute.

LUZON, Laguna Province, Los Baños (*Baker*), 10 specimens, both sexes, taken on *Sterculia foetida*.

Type locality.—FORMOSA (*Matsumura*).

Several specimens from Bengal were described by me as a new species, *T. elongata*, very closely similar to the Formosan

species. Further comparison of these, however, indicates their identity with *T. acutipennis*. This indicates a very wide distribution of the species.

Tenaphalara fascipennis Crawford.

Strogylocephala fascipennis CRAWFORD, Philip. Journ. Sci. § D 12 (1917) 166, pl. 1, fig. 12.

The study of several newly discovered species of Malayan psyllids evidently related to *Tenaphalara* has led me to group together in this genus not only these new species but also the related and more or less intermediate Philippine form for the reception of which a new genus had been erected, *Strogylocephala*. As this was a monotypic genus, this name becomes synonymical with *Tenaphalara*.

LUZON, Laguna Province, Los Baños.

Tenaphalara malayensis sp. nov. Plate II, fig. 3.

Length of body, 3 millimeters; forewing, 3.3. General color flavous to fulvous; thoracic dorsum with slightly darker streaks; vertex brown; antennal segments 3 to 10 black or brown; front and middle tibia brown; eyes black.

Head about as broad as thorax. Vertex a little broader than long, quadrate, with posterior ocelli elevated and a prominent, hornlike, flattened epiphysis on each side between antennal base and posterior ocellus. Genæ swollen beneath antennal sockets and slightly protruding roundly in front of vertex, covering frons; clypeus long, narrowly rounded at apex; beak long. Antennæ about four times as long as width of head, closely approximate at base, segments 1 and 2 short and not very thick, but segment 3 distinctly thicker than succeeding segments. Eyes prominent.

Thorax narrow. Legs long and slender; hind tibiæ with a large spur at base and four black spines at apex. Forewings hyaline, clear, venation as in congeners, but pseudovein between radius and radial sector often wanting.

Abdomen long. Male forceps short, slender, subacutely pointed; anal valve shaped somewhat as in *Aphalara*, with a caudally directed lobe which is nearly as long as basal width. Female genital segment about two-thirds as long as abdomen; valves subequal in length but dorsal blunt at apex and ventral very acutely pointed; dorsal valve with a single horizontal row of twenty or more hairs around end; ovipositor stout, exserted.

PENANG (*Baker*), 2 females. SINGAPORE (*Baker*), 1 male and 2 females.

Tenaphalara juliana sp. nov.

Closely related to *T. malayensis*, differing as follows: Antennæ slender throughout, third segment not thicker than succeeding ones; legs slenderer and shorter; forewings without pterostigma and the marginal cells relatively different in size.

BORNEO, Sandakan (*Baker*), 1 example (genitalia broken off).

Tenaphalara striata sp. nov. Plate II, fig. 5.

Length of body, 2.7 to 3.1 millimeters; forewing, 3 to 3.4. General color orange yellow or fulvous, with narrow black markings on vertex and thoracic dorsum; vertex with five black stripes, one on median line and two on each side; abdomen brownish; femora brown apically; antennæ dark at tip of each segment; forewings hyaline, with several small brown flecks in distal third.

Head not quite as broad as thorax, vertex broader than long, rectangular, nearly straight across front margin, more nearly flat than in congeners, with a slight depression on each side of median line; genæ bulging roundly forward in front of vertex and beneath antennal sockets, covering frons, with a pair of very small, approximate, acutely pointed, conical processes far back just in front of clypeus. Frons not visible except at front ocellus. Antennæ about twice as long as width of head, slender. Beak long.

Thorax moderately broad and robust; metascutellum with two small, blunt epiphyses dorsad. Legs stout; hind tibiæ with a large spur at base and four black spines at apex, one longer than the others and bifid. Forewings long and narrow, hyaline, with a whitish tinge, several black flecks on blisterlike elevations on membrane and a few on veins in distal third; marginal cells subequal.

Abdomen moderately long. Male forceps about as long as anal valve, slender, arched, slightly enlarged at tip; anal valve constricted at base and subspherically swollen above the narrow base, outline in lateral view subcircular. Female genital segment long, nearly as long as abdomen; dorsal valve with a large prominent dorsal projection caudad of large anus, rounded broadly at its apex and bearing a single horizontal row of about ten long setæ; apex of dorsal valve acute and, with acute point of ventral valve, closely embracing the stout ovipositor.

SINGAPORE (*Baker*), 1 pair.

This is obviously close to the typical *Tenaphalara* but somewhat different in the shape of head.

Tenaphalara triozipennis sp. nov. Plate II, fig. 6.

Length of body, 2.1 millimeters; forewing, 2.4. General color reddish brown; thoracic dorsum with several lighter streaks; vertex with four black stripes; venter and legs paler; antennæ light brown; black at tip.

Head scarcely deflexed, nearly or quite as broad as thorax; vertex about as long as broad, somewhat quadrate in outline but anterior portion sharply bent downward, median suture impressed and black, and a parallel black sulcus on each side of it; posterior ocelli small, not elevated; front ocellus not visible from above. Genæ not quite covering frons, scarcely swollen beneath antennal bases, cones wanting. Antennæ a little longer than width of head, slender. Eyes large. Rostrum long.

Thorax scarcely arched, narrow; pronotum moderately long. Legs slender; hind tibiæ with a small spur at base and several short black spines at apex. Forewings narrow, acutely pointed, with several marginal brown spots and apical third maculated irregularly with brown, pterostigma wanting; venation triozine, but resembling that of *Tenaphalara* also.

Abdomen slender, long. Female genital segment long, nearly as long as abdomen, constricted midway; dorsal valve more constricted than ventral, with distal half bluntly rounded at apex.

SINGAPORE (*Baker*), 1 female.

This is a very interesting species, for it is unmistakably closely allied to *Tenaphalara,* resembling especially *T. sulcata* in characters of the head, genitalia, and thorax, but differing in one important venational feature in which the species is distinctly triozine. The absence of the cubital petiole has always been used as the basis for segregating the subfamily Triozinæ, but there are several species which seem to weaken this view. *Pauropsylla triozoptera,* several species of *Rhinopsylla,* and now this new species—all point to a possible fallacy in the current classification.

PSYLLINÆ

In the North Temperate Zone the Psyllinæ is the most numerously represented of the subfamilies, the Triozinæ ranking a close second. In the Tropics, however, there are far fewer species of this subfamily, the Pauropsyllinæ and the Carsidarinæ being the largest. Australia has a good many species of *Psylla,* but their habitat is scarcely tropical. Of the ten or more Temperate Zone genera only three (*Psylla, Arytaina,* and *Euphalerus*) are known thus far to have representatives in the Palæotropics,

while two others (*Epipsylla* and *Metapsylla* appear to be limited to these Tropics. These five genera are included in the following key, a more nearly complete synopsis of the subfamily being available in my monograph.

Subfamily characteristics are not numerous. The genæ are always more or less produced into either conical or flattish, spatulate processes, vertex not cleft in front, usually more or less flat; antennæ always slender, either short or long. Basal tarsus of hind legs always with two clawlike spines at apex; hind tibiæ with or without basal spur. Forewings oval or rhomboidal, very seldom acutely pointed at apex, always with cubital petiole (media and cubitus with common stem).

The most closely related subfamily appears to be Pauropsyllinæ, and this differs in several characteristics, chiefly the almost humpbacked thorax, the usually absent genal processes, usually visible frons, short metacoxal spurs, and several others of less constancy.

Although not strictly a part of the palæotropical fauna, Froggatt's Australian genera of this subfamily are included in the following key:

Key to the genera.

a^1. Genal processes conical, acutely or bluntly pointed; pterostigma of forewing closed (occasionally wanting); antennæ at least longer than width of head.

b^1. Genal cones as long as or longer than vertex, slender and acute, directed forward; antennæ very long, usually longer than body, forewing with or without pterostigma..... Epipsylla Kuwayama.

b^2. Genal cones shorter than vertex, usually directed more or less downward.

c^1. Pleural suture of prothorax extending to middle of lateral extremity of pronotum; genal cones broad and bluntly rounded, usually extending more or less parallel with plane of vertex; forewings often maculated..... Arytaina Foerster.

c^2. Pleural suture of prothorax extending obliquely to posterior corner of lateral extremity of pronotum; genal cones usually declivous, more or less acutely pointed; forewings usually clear. Psylla Geoffroy.

a^2. Genal processes flat, broad, not conical in outline; antennæ seldom long, usually very short.

b^1. Genal processes large, broad, more or less quadrate, scarcely divergent; antennæ seldom very short, though usually moderately so.

c^1. Genal processes in same plane with vertex; flat; eyes more or less recessive and flattened; forewing often rhomboidal, with closed pterostigma or none..... Euphalerus Schwarz.

c^2. Genal processes depressed somewhat from plane of vertex; scarcely flat; eyes usually hemispherical; forewings not rhomboidal, with pterostigma..... Arytaina Frst. also Eucalyptolyma Froggatt.

b^2. Genal processes short and rather broad; antennæ very short.

c^1. Pterostigma wanting; veins not sinuous..... **Brachypsylla Froggatt.**
c^2. Pterostigma of forewing present and closed; veins sinuous; antennæ not longer than width of head..... **Metapsylla Kuwayama.**
c^3. Pterostigma present but open.
d^1. Wings membranous; eyes flattened..... **Syncarpiolyma Froggatt.**
d^2. Wings coriaceous; eyes reniform..... **Eriopsylla Froggatt.**

Genus EUPHALERUS Schwarz

Head nearly or quite as broad as thorax, strongly deflexed; vertex flat, often rugulose, with posterior ocelli scarcely elevated and anterior ocellus visible from above; genal cones large, flat, continuing plane of vertex almost without interruption, usually quadrate; eyes large, somewhat recessive; antennæ variable in length.

Thorax strongly arched and broad; propleural suture extending to middle of end of pronotum, mesonotum large; legs robust, hind tibiæ usually with basal spur; forewings large, broad, rounded or somewhat angulate at apex; membrane thick, subhyaline or opaque, maculated or unicolorous; pterostigma present.

Type of the genus, *Euphalerus nidifex* Schwarz.

Four species are recorded from North America. Five are now known from the Eastern Hemisphere.

Key to the species.

a^1. Head and thorax with a prominent black stripe from tip of genæ to base of forewings and continued along posterior margin of forewing.
b^1. Forewing with distinct pterostigma; first marginal cell larger than second; genal cones quadrate, not at all divergent; vertex deeply rugose or vermiculate-punctate. (South India and Bengal.)
E. vittatus Crawford ('12: 423).
b^2. Forewing with pterostigma small or wanting; first marginal cell a little smaller than second; genal cones slightly divergent; vertex only slightly rugulose. (Philippines.)
E. nigrivittatus Crawford ('13:298).
a^2. Head and thorax without lateral black stripes; forewings maculated.
b^1. Length to tip of folded wings not over 3 millimeters; antennæ not more than twice as long as width of head; genal cones somewhat divergent, not quadrate.
c^1. Forewing much more than twice as long as broad, narrow in basal half; thorax not mottled with brown; inhabiting *Citrus*. (Philippines, Formosa, Java, Malay Archipelago, Bengal, southern India, and southern China.)..... **E. citri** (Kuwayama).
c^2. Forewing scarcely twice as long as broad, broad in basal half, thorax mottled with brown. (Fiji.)..... **E. maculosus sp. nov.**
b^2. Length to tip of folded wings over 4 millimeters; antennæ three times as long as width of head; genal cones quadrate, not divergent; forewings slightly rhomboidal. (Malay Archipelago.)
E. grandis sp. nov.

Euphalerus grandis sp. nov. Plate II, fig. 7.

Length of body, 3.1 millimeters; forewing, 3.2. General color yellowish or greenish brown, mottled on thoracic dorsum, and often on vertex also, with brown; tarsi brown; antennæ black at tip of each segment and apical two segments brown; forewings mottled and banded with brown.

Head not as broad as thorax, strongly deflexed. Vertex quite flat, rugulose, with a very shallow concavity on each side of median line, a small tubercle on each outer angle behind antennal base, a little more than half as long as broad, anterior ocellus on top. Genal cones large, broad, flat, quadrate, two-thirds as long as vertex, on same plane with vertex, nearly contiguous along inner margin, with thick, white pubescence distad. Eyes large, black, somewhat recessive. Antennæ more than three times as long as width of head, very slender.

Thorax very broad, robust, strongly arched. Pronotum long, mesonotum very large. Legs thick; hind tibiæ with a very small spur at base and several black spines at apex. Forewings large, broad, subrhomboidal, veins thick, alternately brown and flavous, membrane thick, flavous, subhyaline, maculated with numerous small brown spots which are aggregated along apical margin into a broad band; pterostigma very large and broad. Hind wings smaller, thin, hyaline, delicate.

Abdomen rather short, thick, humped upward. Male forceps about two-thirds as long as anal valve, relatively thick, bluntly rounded at apex, sides subparallel; anal valve simple, broadest at base and narrowing slightly toward apex. Female genital segment very short, dorsal valve a little longer than ventral, apex subacute and sometimes flexed upward, with long hairs near middle and short bristles at apex.

MOLUCCAS, Toeal (*Muir*), 3 females. TENIMBER ISLANDS, Larat (*Muir*), December, 1907, 3 females and 1 male.

Euphalerus maculosus sp. nov. Plate II, fig. 8.

Length of body, 1.9 millimeters; forewing, 2. General color mottled brown and greenish or dirty white; femora brown, tibiæ pale; antennæ brown at apex of each segment; forewings conspicuously mottled and maculated with brown.

Head small, deflexed, about as broad as prothorax, much narrower than mesothorax across base of forewings. Vertex more than half as long as broad, flat, rugulose, anterior ocellus above; genal cones short, less than half as long as vertex, flat, in same

plane with vertex, divergent, subacutely pointed. Antennæ less than twice as long as width of head, slender.

Thorax broad, arched, legs rather short; hind tibiæ without basal spur, and apical spines short. Forewings subcoriaceous, not transparent, somewhat rhomboidal, veins thick, pterostigma incomplete, membrane and veins spotted and mottled. Hind wings clear, delicate.

Abdomen short. Male forceps about two-thirds as long as anal valve, narrow, subacute at apex, sides parallel; anal valve longer, slender, broadest at base, upper third narrowed.

FIJI ISLANDS, Rewa (*Muir*), March, 1906, 3 males.

Euphalerus vittatus Crawford ('12: 423).

One slightly damaged specimen (female) probably of this species is at hand, collected at Madhavgiri, Bombay, India (*H. H. Mann*), May, 1916, on *Cassia fistula*. The lateral vitta of thorax is wanting and the wing is more extensively mottled with brown. Structurally this specimen resembles the species, but superficially there are some differences. Additional material will show whether or not there are two species in India on the same food plant.

Euphalerus nigrivittatus Crawford ('13: 298).

This species described from one female. Subsequently three additional examples, 1 male and 2 females, of the species have been collected by C. F. Baker at Davao, Mindanao. The description of the male genitalia is now added to the original description.

Male.—Forceps moderately broad at base, narrowing to middle, then abruptly broadened and deeply emarginate at apex, terminating in two points; anal valve longer than forceps, apical half much narrower than base.

The presence of a distinct basal spur on each hind tibia was not mentioned in the first description and is now added.

Distribution.—LUZON, Laguna Province, Los Baños (*Baker*). MINDANAO, Davao (*Baker*).

Euphalerus citri (Kuwayama).

Diaphorina citri KUWAYAMA, Trans. Sapporo Nat. Hist. Soc. 2 (1908) 160.

Euphalerus citri CRAWFORD, Rec. Indian Mus. 7 (1912) 424, pl. 33, figs. N, O, P; pl. 35, fig. D; Philip. Journ. Sci. § D 8 (1913) 299; 12 (1917) 168.

In Mr. Muir's collection there are six specimens of this pretty citrus psyllid, taken at Macao, near Hongkong, China, November, 1906; also, one from Amboina, Moluccas. No food plant

data accompany these, but elsewhere the species inhabits foliage of *Citrus*. The species appears to be very widely distributed throughout the southern portion of the Eastern Hemisphere.

Genus ARYTAINA Foerster

Psyllopa CRAWFORD.

Head nearly or quite as broad as thorax; vertex usually nearly or quite flat, with anterior ocellus visible from above; genæ produced into conical or subquadrate processes extending forward nearly in same plane with vertex but separated from vertex by impressed line. Eyes large, more or less recessive over propleurites. Antennæ slender, moderately long. Thorax usually strongly arched and broad; propleural suture extending to middle of more or less swollen end of pronotum; hind tibiæ with or without basal spur. Forewings usually broadly rounded, hyaline or colored or rarely subcoriaceous, pterostigma present. Hind wings smaller, hyaline and clear.

Key to the species.

a^1. Veins of forewing alternately black and yellow or white.
  b^1. Membrane as well as veins spotted with black or brown; antennæ less than twice as long as width of head; female genital segment not flexed upward at apex.
    c^1. Antennæ about as long as width of head; forewing with a broad, irregular band of brown at apex, and remainder irregularly spotted. (Malay Archipelago.) ..... **A. pulchra sp. nov.**
    c^2. Antennæ nearly twice as long as width of head; forewing without apical band, but more uniformly spotted with small maculæ. (Bengal and Ceylon.) ..... **A. punctipennis** Crawford ('12: 431).
  b^2. Membrane clear, only veins spotted with black; female genital segment flexed upward at apex. (Singapore.)
A. punctinervis sp. nov.
a^2. Veins of forewings not conspicuously spotted as above. Antennæ at least twice as long as width of head.
  b^1. Forewings hyaline, clear; marginal cells subequal.
    c^1. Genal cones subacute; first marginal cell of forewing not quadrate; pterostigma not short and broad. (Bengal.)
A. obscura Crawford ('12: 432).
    c^2. Genal cones very broadly rounded at apex; first marginal cell somewhat quadrate; pterostigma short and broad. (Philippines.)
A. iolani sp. nov.
  b^2. Forewings colored or maculated, not clear; vertex with a tubercle at each outer angle behind antennal base.
    c^1. Genal cones broad, broadly rounded or quadrate; forewings not much over twice as long as broad.
      d^1. Forewings unicolorous, without marginal bands.
        e^1. Forewings flavous; insect about 3 millimeters long to tip of folded wings. (Singapore.) ..... **A. flava sp. nov.**

e^2. Forewings brown; tubercles on vertex large; insect 4 millimeters long to tip of folded wings. (Philippines.)
A. tuberculata Crawford ('17: 169).

d^2. Forewings not unicolorous, margins darker, banded.

e^1. Forewings with an apical band of solid color or made up of small spots, and costal margin often darker; male forceps spatulate; very broad at apex. (Philippines and Borneo.)
A. variabilis Crawford ('17: 168).

e^2. Forewings with an apical and costal band of many small brown spots; male forceps not spatulate, with a prominent convexity on anterior margin (in lateral view). (Malay Archipelago.) ..... A. meridionalis sp. nov.

c^2. Genal cones acutely pointed; short, strongly divergent; forewings about three times as long as broad, mostly brown, with five small clear spots on apical margin. (Singapore.)
A. brevigena sp. nov.

Arytaina meridionalis sp. nov. Plate II, fig. 9.

Length of body, 2 millimeters; length of forewing, 2.1. General color pale straw yellow to very light brown; abdomen with brown markings; antennæ brown on apical third; wings brown except in center pale. Body surface finely pubescent.

Head as broad as thorax, deflexed, nearly transversely straight on hind margin. Vertex flat, large, a little more than half as long as broad, with a shallow depression on each side of median line, a small tubercle on each outer angle just behind antennal base, pubescent; genal cones broad and large, broadly rounded at apex, about half as long as vertex, a little broader than long, not contiguous on inner margin, only slightly depressed from plane of vertex. Eyes large; anterior ocellus on top. Antennæ very long and slender, about two and one-half times as long as width of head.

Thorax broad, well arched. Legs short and thick; hind tibiæ with a black spur at base, and five black spines at apex. Forewings brown on anterior and apical margins and more or less spotted and maculated on rest of membrane, subcoriaceous, more hyaline in central portion, veins with double row of fine setæ; pterostigma pubescent.

Male forceps nearly as long as anal valve, bluntly rounded and somewhat toothed at apex, straight or slightly concave on posterior margin (profile) and with a prominent convexity on anterior margin midway between base and apex; anal valve simple, converging a little toward apex. Female genital segment about half as long as abdomen, both valves acute, subequal in length.

TENIMBER ISLANDS, Larat (*Muir*), December, 1907, 1 pair.

This appears to be closely related to the Philippine species, *A. variabilis*. In wing colors and venation some of the variable Philippine specimens closely resemble the southern form, but in male genitalia they are distinct though suggestively similar, also.

Arytaina flava sp. nov. Plate II, fig. 10.

Length of body, 2.2 millimeters; length of forewing, 2.3. General color flavous yellow, with several dull-colored streaks on thoracic dorsum; eyes black; antennal segments black at tip of each. Body surface sparsely pubescent.

Head not quite as broad as thorax; vertex flattish, with a small foveal impression on each side of median line; with a small tubercle on each outer angle behind antennal base, front ocellus above. Genal cones a little broader than long, about half as long as vertex, broad at apex, scarcely divergent. Antennæ about twice as long as width of head or less, very slender.

Thorax broad, well arched. Legs short, thick; hind tibiæ with spur at base and five or six black spines at apex. Forewings flavous, broadly rounded, veins setigerous, venation somewhat similar to that of *A. meridionalis*.

Male genital segment short; forceps about two-thirds as long as anal valve; moderately stout, not tapering much toward apex, bluntly rounded at tip; anal valve inclined caudad in apical third, a little broader at base than apex, narrow apically.

Female genital segment half as long as abdomen or more, both valves acute or subacute, subequal in length.

SINGAPORE (*Baker*), 2 females. BORNEO (*Baker*), 1 male and 1 female. The latter differ slightly from the Singapore specimens in having shorter antennæ, and the second marginal cell of forewing not quadrate. All appear, however, to be representatives of the same species.

Arytaina iolani sp. nov. Plate II, fig. 11.

Length of body, 2 to 2.3 millimeters; forewing, 2 to 2.3. General color flavous to orange red, eyes black; antennæ black at tip of each segment; forewings slightly flavous. Body surface glabrous.

Head nearly as broad as thorax, deflexed. Vertex flat, about half as long as broad, with a very shallow depression on each side of median line, with a small tubercle on each outer angle behind antennal base. Genal cones as broad as long, broadly rounded at apex, somewhat divergent. Antennæ a little less than twice as long as width of head.

Thorax arched, broad. Legs moderately long and slender;

hind tibiæ with spur at base. Forewings hyaline, veins yellow, with three small brown spots on apical and posterior margins; pterostigma short.

Male forceps a little more than half as long as anal valve, shaped irregularly somewhat as in *A. meridionalis;* anal valve plain, narrowing toward apex. Female genital segment as long as abdomen, slender; dorsal valve a little longer than ventral, both acute.

LUZON, Laguna Province, Los Baños (*Baker*), 1 pair.

The male genitalia, shape of head, and venation of forewing point to a close relationship between this species and *A. meridionalis,* of the Malay Archipelago; and it appears, also, that *A. flava,* of Singapore, is related to both.

Arytaina brevigena sp. nov. Plate III, fig. 4.

Length of body, 2.2 millimeters; forewing, 2.3. General color chocolate brown with fine reddish spots and markings on thorax and larger reddish areas on vertex; legs variegated chocolate brown and light brown; antennæ black on apical half of each segment, rest flavous; forewings brown, lighter in central portion; with five round clear spots on apical margin.

Head nearly as broad as thorax, not much deflexed. Vertex about half as long as broad, with a foveal depression on each side of median line and a blunt, thick tubercle on each outer angle behind antennal base. Genal cones short and strongly divergent, acutely pointed, extending only a very little beyond antennal socket; antennæ three times as long as width of head, slender.

Thorax not strongly arched, narrower than in many congeners, pubescent with very short, fine hairs. Femora short and thick; hind tibiæ longer, slender, with a small spur at base. Forewings uniformly broadening from base to apex, latter rounded, margins nearly straight, veins setigerous, dark; membrane black or brown except in central portion of wing and five small spots on apical margin.

Female genital segment about two-thirds as long as abdomen; acutely pointed, dorsal valve longer than ventral, with a prominent constriction on dorsal valve beyond end of anal opening, terminal half acuminate and slender.

SINGAPORE (*Baker*), 4 females (2 in poor state of preservation).

Arytaina pulchra sp. nov. Plate III, fig. 3.

Length of body, 2.2 millimeters; forewing, 2.3. General color brown; vertex dirty brown, thorax reddish or chestnut brown;

antennæ black at tip of each segment; femora dark, tibiæ light brown; forewings maculated with brown on veins and membrane, and apical portion solid brown, membrane whitish between maculæ.

Head not as broad as thorax, well deflexed; vertex nearly flat, slightly convex at median line in anterior portion, a little more than half as long as broad, slightly rugulose; genal cones nearly in same plane with vertex, quadrate, broad on apical margin, nearly contiguous, a little less than half as long as vertex, slightly pubescent. Antennæ scarcely longer than width of head.

Thorax broad and strongly arched, pronotum moderately long. Legs thick; hind tibiæ without basal spur. Forewings subhyaline, slightly rhomboidal, veins thick and alternately brown and whitish; membrane whitish between brown maculæ which are scattered over membrane and at apex are concentrated into a broad, brown band; pterostigma short and broad.

Female genital segment very short, dorsal valve a little longer than ventral, both acute.

TENIMBER ISLANDS, Larat (*Muir*), 1 female.

Arytaina punctinervis sp. nov. Plate III, fig. 1.

Length of body, 1.5 millimeters; length of forewing, 1.5. General color black variegated with orange red; dorsum of head and thorax mostly orange red with many black markings and figures; abdomen and venter mostly black with red markings; genal cones red above and below, and black laterad; antennæ with alternating black and orange bands; forewings hyaline, veins and margins alternately black and yellow; legs orange, with black dots and bands.

Head not as broad as thorax. Vertex flat or slightly convex with a narrow, black, foveal depression on each side of median suture, a little more than half as long as broad. Genal cones about two-thirds as long as vertex, subacute, somewhat divergent, nearly in same plane with vertex. (Antennæ mutilated.)

Thorax well arched, robust. Legs short, small; hind tibiæ without basal spur. Forewings broadly rounded, hyaline, conspicuously marked somewhat as in *A. punctipennis*, but membrane between veins not maculated as in that species.

Female genital segment about half as long as abdomen, dorsal valve longer than ventral, flexed upward and very acutely pointed at apex; ventral valve acute.

SINGAPORE (*Baker*), 1 female.

This species is apparently closely related to *A. punctipennis*,

a species found in Bengal and Ceylon. The differences between the two species are sharp but do not conceal their close relationship.

Arytaina punctipennis Crawford.

Psyllopa punctipennis CRAWFORD, Rec. Indian Mus. 7 (1912) 431, pl. 34, figs. K, O; pl. 35, fig. U.

Arytaina punctipennis CRAWFORD, Philip. Journ. Sci. § D 12 (1917) 170.

Distribution.—BENGAL, Pusa. CEYLON, Peradeniya.

Food plant.—Indigo (*Indigofera*).

Arytaina obscura Crawford.

Psyllopa obscura CRAWFORD, Rec. Indian Mus. 7 (1912) 432, pl. 34, fig. S; pl. 35, fig. M.

Distribution.—BENGAL, Pusa.

Food plant.—Mango (*Mangifera*).

Arytaina variabilis Crawford ('17: 168).

Distribution.—MINDANAO, Butuan, Davao. LUZON, Tayabas Province, Malinao: Laguna Province, Mount Banahao. BORNEO, Sandakan (*Baker*), 1 male.

Arytaina tuberculata Crawford ('17: 169).

Distribution.—MINDANAO, Davao.

Genus EPIPSYLLA Kuwayama

Head long, not strongly deflexed, vertex rather flat, genal cones very long, longer than vertex, conical and more or less divergent, porrect; eyes large; antennæ long, slender. Thorax not strongly arched; pronotum long. Forewings hyaline, rounded at apex, pterostigma distinct or nearly wanting.

The general aspect of the body is similar to that of *Psylla*, but the very long genal cones easily distinguish this genus.

Type of the genus, *Epipsylla albolineata* Kuwayama.

Key to the species.

a^1. Head and thorax with a pair of conspicuous white or yellow, black-margined stripes from tip of genal cones to base of abdomen, where they meet.

b^1. Head with a second pair of white, black-margined stripes, one from each antennal socket to posterior ocellus; pterostigma of forewing narrow; male forceps with a long tooth on inner face; genal cones about as long as vertex. (Philippines and Malay Archipelago.) E. pulchra Crawford ('13: 297).

b^2. Head without second pair of white stripes; pterostigma wanting; male forceps without inner tooth; genal cones longer than vertex. (Formosa.) ..... E. albolineata Kuwayama ('08: 178).

a^2. Head and thorax without white stripes.

b^1. Pterostigma of forewing wanting; antennæ one and one-half times as long as body (without wings); forceps distinctly shorter than anal valve; much of thoracic dorsum red. (Formosa.)

E. rubrofasciata Kuwayama ('08: 179).

b^2. Pterostigma large; antennæ about as long as body (without wings); forceps longer than anal valve; thoracic dorsum orange yellow. (Philippines and Malay Archipelago.)

E. forcipata Crawford ('17: 167).

Epipsylla pulchra Crawford ('13: 297).

This species has been taken by C. F. Baker at three stations in the Philippine group; namely, Los Baños and Baguio, Luzon; and Davao, Mindanao. Frederick Muir has taken one male on Amboina, in the Moluccas. This specimen has all the characteristics of the Philippine specimens except that the forceps of the male genitalia have a much smaller tooth on the inner face.

Epipsylla forcipata Crawford ('17: 167).

The type locality of this species is Puerto Princesa, Palawan, Philippine Islands. The distribution seems to be wider, however, for a single female has been taken by C. F. Baker on Penang Island.

Genus PSYLLA Geoffroy

This genus is a large one and is widely distributed. Its taxonomic definition is not wholly clear, as it embraces at present species which probably should properly not be included. Several Australian species, for example, and a few Asiatic species are probably generically distinct but at present are not separated. A full description and a discussion of the genus are given in my monograph of this family.

In the following key an attempt has been made to include all described species of the South Pacific, Australia, southern Asia and its islands, including Formosa, and the Philippine and Malay Archipelagoes. Many of these species are known to me only by their descriptions, so that the key must be more limited in value than it might be otherwise.

Key to the species.

a^1. Forewings hyaline, clear, not colored, veins usually brown or black.

b^1. Body bright red; antennæ about two and one-half times as long as width of head.

c^1. Genal cones longer than vertex; male forceps spatulate, broad at apex; antennæ and legs reddish. (Philippines.)

P. colorada Crawford ('17: 170).

c^2. Genal cones shorter than vertex; forceps acutely pointed; antennæ and legs whitish. (Formosa.).... P. coccinea Kuwayama ('08: 171).

b^2. Body not bright red.
c^1. Genal cones longer than vertex.
d^1. Antennæ three-fifths as long as costa; forewings always clear; body yellowish red, with notal streaks. (Formosa.)
P. arisana Kuwayama ('08: 168).
d^2. Antennæ one-half as long as costa; forewings sometimes slightly yellowish; body yellowish brown with notal streaks. (Formosa.) ..... **P. kiushuensis** Kuwayama ('08: 174).
c^2. Genal cones not longer than vertex.
d^1. Antennæ about twice as long as width of head.
e^1. Genal cones subacutely pointed, distinctly conical in shape.
f^1. Body brown; forewings with a black spot at tip of claws. (India.) ..... **P. simlæ** Crawford ('12: 426).
f^2. Body orange yellow, with conspicuous black and white markings on thoracic dorsum and vertex; wing clear, without black spot. (Philippines.) ..... **P. bakeri** sp. nov.
e^2. Genal cones broadly rounded; forewings without black spot. (Australia.)
f^1. Body pubescent, light brown; genal cones small; male forceps fingerlike; on *Acacia pendula*. (Australia.)
P. acaciæ-pendulæ Froggatt ('01: 247).
f^2. Body not pubescent, gray, genal cones large; on *Acacia pendula*. (Australia.) .... **P. gracilis** Froggatt ('03: 327).
d^2. Antennæ four or five times as long as width of head; forewing without pterostigma.
e^1. Genal cones well separated and divergent, about as long as vertex and of similar color; costa of forewing not hairy. (Philippines.) ..... **P. leprosa** sp. nov.
e^2. Genal cones not divergent, contiguous distad, not as long as vertex, white, costa of forewing hairy. (Fiji Islands.)
P. compta sp. nov.
a^2. Forewings not clear, more or less flavous, fumate or colored.
b^1. Forewings not opaque, more or less transparent.
c^1. Forewings not mottled nor maculated.
d^1. Forewings about three times as long as broad.
e^1. Antennæ about twice as long as width of head or more; body reddish brown.
f^1. Thorax mottled with black; legs long; genal cones not very small; body about 1.6 millimeters long. On *Acacia pycnantha*. (Australia.)
P. acaciæ-pycnanthæ Froggatt ('01: 243).
f^2. Thorax not mottled; legs short; genal cones very short, not visible from above; body about 1 millimeter long. On *Acacia decurrens*. (Australia.)
P. candida Froggatt ('01: 252).
e^2. Antennæ scarcely longer than width of head; body ocherous; male forceps slender. On *Sterculia*. (Australia.)
P. sterculiæ Froggatt ('01: 255).
d^2. Forewings about two and one-half times as long as broad or less, body color dull yellowish or brown.

e^1. Insect small, body 0.9 millimeter long; genal cones short, quadrate; male forceps thick, short. On *Acacia dealbata*. (Australia.) ..... P. acaciæ-dealbatæ Froggatt ('03: 326).

e^2. Insect larger, body nearly or quite 2 millimeters long.

f^1. Genal cones nearly as long as vertex, subacute; body color dull yellow. (Formosa.)

P. toroensis Kuwayama ('08: 172).

f^2. Genal cones scarcely half as long as vertex, rounded at apex; body color brown with white markings. (Malay Archipelago.) ..... P. muiri sp. nov.

e^2. Forewings mottled, maculated or banded.

d^1. Forewings about twice as long as broad, covered with numerous small dark spots; body color dull yellowish; antennæ rather short.

e^1. Genal cones about as long as vertex, truncate at apex; wings yellowish, body not pubescent. (Formosa.)

P. tripunctata Kuwayama ('08: 174).

e^2. Genal cones very short, broad, rounded; wings gray, semiopaque; dorsum of body gray, pubescent. On *Acacia baileyana*. (Australia.)

P. acaciæ-baileyanæ Froggatt ('01: 257).

d^2. Forewings not covered with numerous small spots, but irregularly clouded or banded.

e^1. Thorax and head yellowish; wings about three times as long as broad, semiopaque, mottled with brown; antennæ long, genal cones rather large, broad. On *Acacia* sp. (Australia.)

P. frenchi Froggatt ('01: 245).

e^2. Thorax and head brown or black.

f^1. Forewings subhyaline, more or less fumate or dark in apical portion; body moderately large.

g^1. Antennæ as long as forewings or longer; forewings irregularly fumate throughout, darker apically; insect over 4 millimeters long.

h^1. Genal cones as long as vertex; female genital segment as long as abdomen. (Philippines.)

P. crenata Crawford ('17: 171).

h^2. Genal cones scarcely two-thirds as long as vertex; female genital segment one-third as long as abdomen. (Borneo.) ..... P. fumosa sp. nov.

g^2. Antennæ about half as long as forewings; wings glassy, with a brown band from tip of clavus to tip of radius; insect about 3 millimeters long. (Formosa.)

P. spadica Kuwayama ('08: 165).

f^2. Forewings semiopaque, broadly and irregularly clouded with brown.

g^1. Thorax brown with yellowish patches and markings. On *Acacia implexa*. (Victoria.)

P. lidgetti Maskell. Froggatt ('01: 245).

g^2. Thorax black or dark brown; genal cones very small; antennæ short; wings about twice as long as broad, with a large whitish area near middle and rest brown or mottled. On *Acacia juniperina*. (Australia.)

P. acaciæ-juniperinæ Froggatt ('03: 328).

b^2. Forewings opaque, mottled with brown; genal cones acutely conical; wings about twice as long as broad.

c^1. Thorax ocherous, mottled with brown; forceps long and slender.

d^1. Genal cones very long, acutely pointed; antennæ very long; legs long; wings twice as long as broad. On *Acacia decurrentis*. (Australia.)..... P. acaciæ-decurrentis Froggatt ('01: 248).

d^2. Genal cones short, broad at base, acutely pointed; antennæ moderately short; legs short; wings less than twice as long as broad. On *Capparis mitchelli*. (Australia.)

P. capparis Froggatt ('01: 250).

c^2. Thorax dark brown, mottled with dull yellow; forceps short; genal cones large, moderately long, pointed; antennæ very short; legs short. On *Apophyllum anomalum*. (Australia.)

P. schizoneuroides Froggatt ('01: 253).

Psylla fumosa sp. nov.

Length of body, 2.3 millimeters; forewing, 3. General color brown, with small lighter areas about base of wings and on pronotum; antennæ brown except basal one-fourth yellowish; forewings smoky, a little more densely browned irregularly in apical portion. Body surface pubescent with short, fine hairs.

Structurally similar to *P. crenata* Crawford ('17: 171), to which species this is apparently closely related, differing as follows: Genal cones about two-thirds as long as vertex, bluntly rounded at apex, somewhat divergent; antennæ a little longer than forewings but not quite as long as body and wings combined; thorax more slender; wing venation similar, except cubital petiole (M+Cu) only half as long as stem of cubitus (Cu), while in *P. crenata* it is nearly three-fourths as long; forewing narrower relatively.

Male forceps stout, as long as anal valve, somewhat falcate, broadest midway and arched forward, subacutely pointed; anal valve moderately long, tapering from base to apex, apical third slender and inclined backward. Female genital segment short, about one-third as long as abdomen.

BORNEO, Sandakan (*Baker*), 1 male and 1 female.

This is a close relative of *Psylla crenata* but is surely distinct. It approaches to a confusing degree certain species of *Arytaina*.

Psylla leprosa sp. nov. Plate III, fig. 8.

Length of body, 2 millimeters; forewing, 2.9; antennæ, 4.2. General color lemon yellow with leprous-white areas; vertex in center of pronotum, posterior edge of dorsulum, paraptera, and metascutum white; legs pale; wings clear or slightly yellow, antennal segments 1 and 2 pale, 3 black at extreme tip, 4 black on distal third, 5 black on distal half, 6 black on distal two-thirds, 7 pale at base, 8 to 10 black.

Head broad and short, about as broad as thorax, deflexed; vertex scarcely half as long as broad between eyes, roundly convex on each side of median line in front, posterior ocelli well elevated; genal cones as long as vertex, subacute, divergent, scarcely contiguous even at base, sparsely hirsute; eyes large; antennæ very long and slender, longer than body to tip of folded wings, more than four times as long as width of head.

Thorax broad, arched, dorsal surface sparsely hairy. Legs rather long and slender; hind tibiæ without spur at base, and apical spines short. Forewings clear or slightly flavous, veins yellow, narrow; pterostigma wanting or very narrow.

Abdomen short. Female genital segment very short, about one-third as long as abdomen, dorsal valve a little longer than ventral, both subacute.

BASILAN (*Baker*), 1 female.

Psylla bakeri sp. nov. Plate III, fig. 9.

Length of body, 1.9 millimeters; forewing, 2.3. General color orange yellow or paler, with conspicuous white and black markings as follows: Pronotum black cephalad and white caudad; dorsulum black on anterior margin, white on posterior margin and center orange colored; mesoscutum black on part of anterior margin; mesoscutellum and metascutum white; vertex with a small black or brown discal area on each side of median suture, and a white area caudad of these and extending to median suture; eyes dark; antennæ orange with apex of each segment brown; wings clear.

Head strongly deflexed, about as broad as thorax, short; vertex not half as long as broad between eyes; roundly convex on each side of median suture in front; with a small, shallow, foveal depression on each side, elevated at posterior ocelli. Genal cones as long as vertex, well separated, and inner margins nearly parallel to near base, subacute. Antennæ a little more than twice as long as width of head, slender.

Thorax broad, arched, not pubescent. Legs rather short, but hind legs long; hind tibiæ without basal spur and distal spines short. Forewings clear or very slightly fumate, veins yellowish, pterostigma large.

Abdomen short. Female genital segment about as long as abdomen, thick at base and narrowing abruptly to acute tip, dorsal valve longer than ventral, both acutely pointed.

LUZON, Laguna Province, Los Baños (*Baker*), 1 female: Benguet Subprovince, Baguio (*Baker*), 1 female.

Psylla compta sp. nov. Plate III, fig. 11.

Length of body, 1.9 millimeters; forewing, 2.3; antennæ, 3.5. General color orange; genal cones entirely white, pronotum posteriorly margined broadly with white, dorsulum on posterior margin narrowly margined with white and two white areas on mesoscutellum; venter of thorax and dorsum of abdomen dark brown; abdomen ventrad pale whitish; legs flavous, except front tarsi brown; antennæ brown except three basal segments orange; forewings clear.

Head strongly deflexed, nearly or quite as broad as thorax; vertex half as long as broad between eyes, elevated at posterior ocelli, with a very small foveal depression on each side of median suture, sparsely hairy, median suture scarcely impressed and narrowly black. Genal cones slender, conical, not quite as long as vertex, acutely pointed in apical half or third, closely appressed to each other, very briefly pubescent. Antennæ very long, five times as long as width of head, segments 3 and 4 slightly thicker than in most species.

Thorax slightly pubescent; legs long, slender, hind tibiæ with basal spur, distal spines numerous. Forewings clear, veins yellow or brownish, costal vein conspicuously hairy; pterostigma narrow or wanting.

Male genital segment moderately small, forceps small, about half as long as anal valve, slender, acutely pointed, simple; anal valve rather long, broadest at base and converging slightly toward subacute apex.

Fiji Islands (*Muir*), 1905, 1 male and 1 imperfect example.

The most characteristic feature of this pretty species is the form of the genal cones which is suggestive of the genus *Neotriozella.*

Psylla muiri sp. nov. Plate III, fig. 5.

Length of body, 2 millimeters; forewing, 2.1. General color chocolate brown with irregular and narrow white markings and stripes on thorax, vertex, and abdomen; legs light brown or femora darker; antennæ pale with apex of each segment darker; forewings fumate or brown, with a dark spot at tip of clavus and three others on posterior margin.

Head deflexed, not quite as broad as thorax, vertex roughly triangular in outline, half as long as broad, with a small protuberance behind eyes on outer margin, a small foveal depression on each side of median suture and the two connected by a shallow transverse fossa. Genal cones scarcely half as long as vertex, narrowly rounded at apex, declivous from vertex, divergent;

antennæ a little more than twice as long as width of head, slender. Eyes larger, somewhat recessive.

Thorax arched, broad, robust. Legs rather short, stout; hind tibiæ with a small spur at base. Forewings short, browned but hyaline, veins with short setæ; pterostigma short and broad.

Abdomen thick. Male forceps not quite as long as anal valve, broadly spatulate in apical half, broad at apex and part of apical margin finely toothed; anal valve simple, broadest at base, narrowing to subacute apex. Female genital segment nearly as long as abdomen, dorsal valve longer than ventral and both acutely pointed.

TENIMBER ISLANDS, Larat, December, 1907 (*Muir*), 10 females. MOLUCCAS, Amboina (*Muir*), 2 males and 1 female.

This species approaches *Arytaina* in some respects, as in the character of genal cones and shape of forewing.

TRIOZINÆ

The most easily visible, though not the most constant, character of this subfamily is the point of furcation of the basal vein of the forewing—the cubitus, media, and radius leaving the basal vein at quite or nearly the same point. *Ceropsylla* and *Hemitrioza,* both American genera, are exceptions to this. On the other hand, several species belonging to other subfamilies, possess this characteristic, as follows: *Rhinopsylla,* and *Tenaphalara triozipennis,* of the subfamily Carsidarinæ; and *Pauropsylla triozoptera* and *Leptynoptera,* of the subfamily Pauropsyllinæ. However, the exceptions are comparatively few, and this character remains the best for subfamily distinction.

The body is typically slender, eyes hemispheric, frons covered by the genæ (except in *Cerotrioza bivittata*); basal tarsus of hind legs always lacks the clawlike spines which are present in most of the other subfamilies. A full description of the subfamily Triozinæ is given in my monograph, page 64.

Key to the genera.

a^1. Hind tibiæ without basal spur and without subapical spiniform tooth; no anterior processes of metacoxæ.

b^1. Forewings with three marginal spots, made up of numerous minute punctations, on hind margin.

c^1. Genal cones present, but not always conical.

d^1. Genal cones more or less divergent, not closely appressed to each other.

e^1. Notum scarcely arched; pronotum relatively long; genal cones directed forward..... Leuronota Crawford.

e^2. Notum well arched; pronotum short; genal cones more or less declivous.

f^1. Usually not gall makers, though sometimes leaf curlers. A large varied assemblage of species..... Trioza Foerster.

f^2. Gall makers. A small and poorly defined assemblage of mostly Southern Hemisphere species..... Cecidotrioza Kieffer.

d^2. Genal cones not at all divergent, long and closely appressed to each other..... Neotriozella Crawford.

c^2. Genal cones wanting; genæ sometimes swollen beneath antennal sockets; notum usually not much arched..... Kuwayama Crawford.

b^2. Forewings without marginal spots on hind margin; veins usually setigerous..... Hevaheva Kirkaldy.

a^2. Hind tibiæ with a basal spur (sometimes small).

b^1. Antennæ slender, not densely hairy.

c^1. Forewings not opaque nor maculated, but transparent, with radius usually short; vertex not produced cephalad into horns; metacoxæ with a pair of anteriorly directed processes; hind tibiæ usually with a conspicuous spiniform tooth near apex; genal cones present or wanting, seldom conical.... Megatrioza Crawford.

c^2. Forewings semiopaque or opaque, maculated, with radius extending nearly to tip; vertex produced cephalad into a pair of horns. Cerotrioza g. nov.

b^2. Antennæ thick and very densely hairy; genal cones present; vertex very broad; forewings transparent, radius long. Stenopsylla Kuwayama.

Trichochermes Kirkaldy (Kuwayama '10: 54), as represented by two Japanese species, is not recognized in this work as distinct from *Trioza*. It was separated chiefly on the pubescent or hirsute dorsum, but this makes a very unnatural and wholly unsatisfactory division. At least one species of *Trioza*, named by Kuwayama himself, has the pubescent dorsum characteristic of the other group but was placed by him in *Trioza* rather than in *Trichochermes*. *Trichochermes bicolor* Kuwayama appears to be very close to my *Trioza divisa*. Both of Kuwayama's species of *Trichochermes* are included in the synoptic key to the species of *Trioza*.

Epitrioza Kuwayama ('10: 55), as originally characterized, appears to be not a well-defined genus. Its chief distinguishing character was said to be the position of the forewing apex in relation to the apical veins, but this characteristic is so variable in the genus *Trioza* that confusion and quite unnatural segregation of species would surely result if this criterion were adhered to closely. Kuwayama's characterization of both the genus and its one species is rather incomplete, but certain features suggest a rather close relationship of this to my *Megatrioza*. However, until an opportunity is had to examine material of this Japanese species, I do not wish to make any disposition of it nor to merge *Megatrioza* into it.

Genus TRIOZA Foerster

Trioza is a very large genus of which many of the species are difficult to distinguish. It appears to be a group in which very active evolution of new species is in progress, especially in the North Temperate Zone. In the Tropics and the South Temperate Zone it is much less numerously represented, most of the triozine species there being in other genera, chiefly *Megatrioza* with its armed hind tibiæ. With *Cecidotrioza* Kieffer I am unfamiliar. Whether or not it is truly distinct from *Trioza* or *Megatrioza* is not yet clear.

Key to the species.

a^1. Hind wings normally developed, at least half as long as forewings.
  b^1. Forewings more or less colored, not wholly clear.
    c^1. Dorsum and vertex hairy; forewings thickened and darkened on basal third, remainder glassy.
      d^1. Forewings nearly three times as long as broad; media and cubitus each forking beyond its midpoint. (Japan.)
        T. (Trichochermes) bicolor Kuwayama ('10: 54).
      d^2. Forewings two and one-half times as long as broad; media and cubitus each forking at or near its midpoint, making the marginal cells relatively longer. (Philippines.)
        T. divisa Crawford ('17: 172).
    c^2. Dorsum and vertex not hairy.
      d^1. Forewings somewhat coriaceous, dull opaline in color, about two and one-half times as long as broad. (Tasmania.)
        T. tasmaniensis Froggatt ('03: 329).
      d^2. Forewings semitransparent, somewhat browned, about four times as long as broad. (Tasmania.)
        T. dobsoni Froggatt ('03: 331).
  b^2. Forewings not colored, glass clear or sometimes very slightly yellowed or smoky.
    c^1. Forewings broadly rounded at apex, not angular nor acutely pointed, less than three times as long as broad.
      d^1. Genal cones distinctly shorter than vertex.
        e^1. Forewings nearly three times as long as broad; antennæ long; forming galls on *Eucalyptus*.
          f^1. Legs short, stout; genal cones with long hairs. (Australia.)
            T. orbiculata Froggatt ('01: 274).
          f^2. Legs long and slender; genal cones less hairy. (Australia.)
            T. eucalypti Froggatt ('01: 277).
        e^2. Forewings not more than two and one-half times as long as broad; antennæ rather short.
          f^1. Body light green; genal cones very short; curling foliage of *Olearus*. (Tasmania.)..... T. oleariæ Froggatt ('03: 332).
          f^2. Brown to almost black; genal cones one-half to two-thirds as long as vertex; forming galls on *Metrosideros*. (Hawaii.)
            T. ohiacola Crawford ('18: 442).
      d^2. Genal cones as long as vertex or sometimes longer.

e^1. Antennæ two to three times as long as width of head; dorsum scarcely hirsute; insect small to medium in size.

f^1. Genal cones large, broadly rounded at apex, scarcely conical, with long pubescence; forming galls on *Eucalyptus*. (Australia and Tasmania.)..... T. carnosa Froggatt ('01: 275).

f^2. Genal cones more or less acutely pointed, distinctly conical.

g^1. Cubitus forked at or very near its midpoint; inhabiting galls on *Metrosideros*.

h^1. Costa of forewing with setæ; male forceps notched behind near apex; color usually orange. (Hawaii.)
T. iolani Kirkaldy. Crawford ('18: 441).

h^2. Costa of forewing without easily visible setæ; male forceps not notched near apex.

j^1. Genal cones longer than vertex; antennæ two and one-half to three times as long as width of head; thoracic dorsum usually striped with brown; male forceps abruptly narrowed near apex. (Hawaii.)
T. lanaiensis Crawford ('18: 443).

j^2. Genal cones about as long as vertex.

k^1. Color of body black, dorsum reticulately marked; insect about 3.5 to 4 millimeters long. (Hawaii.)
T. pullata Crawford ('18: 444).

k^2. Color orange or flavous, dorsum not so reticulated; insect 4 to 5 millimeters long. (Hawaii.)
T. hawaiiensis Crawford ('18: 444).

g^2. Cubitus forked distinctly distad of its midpoint.

h^1. Body color dark brown; wing veins margined with brown; on *Casuarina*. (Australia.)
T. casuarinæ Froggatt ('01: 284).

h^2. Color yellow to orange; wing veins not dark margined.

j^1. Antennæ three times as long as width of head, black at tip. (India.)..... T. hyalina Crawford ('12: 428).

j^2. Antennæ twice as long as width of head, distal half black. (India and Europe.)
T. urticæ Linn. Crawford ('12: 434).

e^2. Antennæ four times as long as width of head; dorsum sparsely hirsute and wing veins setose; insect large.

f^1. Genal cones about as long as vertex; wing veins uniform in color from base to apex of wing. (India.)
T. gigantea Crawford ('12: 428).

f^2. Genal cones nearly twice as long as vertex; wing veins black in distal half, remainder orange red. (Singapore.)
T. tenuicona sp. nov.

c^2. Forewings more or less acutely angled or pointed at apex, not broadly rounded.

d^1. Forewings three times as long as broad or longer.

e^1. Gall makers.

f^1. General color yellowish; forewings very long and acutely pointed; forming galls on *Eucalyptus*. (South Australia.)
T. multitudina (Tepper). Froggatt ('01: 280).

f^2. Color reddish brown; forewings very long but very acutely pointed; forming galls on *Tristania*. (Queensland.)
T. tristaneæ Froggatt ('03: 334).

e^2. Not gall makers; general color greenish, yellowish or light brown.

f^1. Radius of forewing very short, straight; antennæ short; insect small, about 1 to 2 millimeters long. (Australia.)
T. banksiæ Froggatt ('01: 281).

f^2. Radius very long, extending nearly to apex of wing, more or less sinuate; antennæ not very short; insect larger, 3 to 4 millimeters long.

g^1. Head black, abdomen brown above and pale beneath. (Japan.) ..... T. nigriceps Kuwayama ('10: 60).

g^2. Head yellowish green, abdomen green. (Japan and Philippines.) ..... T. magna Kuwayama ('10: 59).

d^2. Forewings less than three times as long as broad.

e^1. Thoracic dorsum not conspicuously pubescent nor hirsute.

f^1. Thorax chiefly black or dark brown; antennæ mostly brown to black, sometimes basal segments pale.

g^1. Genal cones black.

h^1. Antennæ wholly black or dark brown.

i^1. Antennæ about three times as long as width of head; radial stem forking distad of its midpoint. (Japan.)
T. nigra Kuwayama ('10: 57).

i^2. Antennæ two times as long as width of head; radial stem forking at its midpoint. (India.)
T. analis Crawford ('12: 429).

h^2. Antennæ with third segment whitish. (Japan, Europe.)
T. galii Foerster. Kuwayama ('10: 57).

g^2. Genal cones yellow to orange; antennæ twice as long as width of head, black or basal third brown. (Formosa.)
T. formosana Kuwayama ('10: 58).

f^2. Thorax yellow, greenish or orange to reddish, rarely darker.

g^1. Forewings with first marginal cell larger than second; thoracic dorsum yellowish with brown streaks; genal cones short, half as long as vertex. (Formosa.)
T. brevifrons Kuwayama ('10: 61).

g^2. Marginal cells nearly equal in size.

h^1. Radius short, straight.

i^1. Genal cones as long as vertex, acute at apex; insect about 4 millimeters long or more.

j^1. Antennæ about two and one-half times as long as width of head, black; abdomen green ventrad. (Japan and Europe.)
T. remota Frst. Kuwayama ('10: 60).

j^2. Antennæ less than twice as long as width of head, light brown; abdomen brown. (Bengal.)
T. jambolanæ Crawford ('17: 173).

i^2. Genal cones much shorter than vertex, rounded at apex; insect less than 4 millimeters long.

j^1. Antennæ more than twice as long as width of head; insect small, about 2.5 millimeters long, forming galls on *Eucalyptus*. (Australia.)
T. circularis Froggatt ('01: 279).

j^2. Antennæ very short, not much longer than width of head; insect larger, 3.5 millimeters long, not gall makers. (Bengal, Singapore.)
T. fletcheri Crawford ('12: 434).

h^2. Radius not very short, reaching nearly to tip of wing, often curved or sinuate.

i^1. Abdomen and genal cones black, latter as long as vertex. (Japan.)
T. striola Flor. Kuwayama ('10: 62).

i^2. Abdomen and genal cones light brown or yellow; cones shorter than vertex.

j^1. Radius of forewing nearly straight or bent inward near middle; antennæ usually pale yellow, but sometimes brown.

k^1. Antennæ rather short, not over twice as long as width of head.

l^1. Body orange yellow to red, sometimes dark red; insect about 4 millimeters long. (Japan.)
T. salicivora Reut. Kuwayama ('10: 59).

l^2. Body green or yellowish, about 3 millimeters to tip of folded wings. (Japan.)
T. viridula Zett. Kuwayama ('10: 61).

k^2. Antennæ three times as long as width of head; body bright yellow, abdomen green. (Japan.)
T. silacea M. D. Kuwayama ('10: 58).

j^2. Radius of forewing sinuate; antennæ black, thorax yellowish. (Japan.)
T. curvatinervis Foerster. Kuwayama ('10: 62).

e^2. Thoracic dorsum more or less conspicuously pubescent or sparsely hirsute; radius short.

f^1. Genal cones nearly or quite as long as vertex; forewings very acutely pointed; pubescence moderately dense.

g^1. Fore tibiæ with two stout spines at apex; body color yellow to reddish brown; apex of forewing at end of media. (Australia.) ..... T. eugeniæ Froggatt ('01: 282).

g^2. Fore tibiæ without apical spines; body color dark brown; apex of forewing within second marginal cell. (Formosa.)
T. (Trichochermes) hyalina Kuwayama ('10: 55).

f^2. Genal cones scarcely half as long as vertex; forewings less acutely pointed, veins setigerous; pubescence very sparse. (Philippines.) ..... T. luzonensis Crawford ('17: 173).

a^2. Hind wings greatly aborted, reduced to very small stubs; forewings long and acutely pointed, marginal cells far separated. (Singapore.)
T. diptera sp. nov.

The foregoing key has been arranged in part on descriptions of species which in some instances are too meager and indefinite for

this purpose. It is quite possible, therefore, that some errors may exist in the synopsis; notwithstanding this, the key will serve as an assistance in future work because of the scattered condition of the literature on this subfamily.

Trioza magna Kuwayama ('10: 59).

Length of body, 2.2 to 2.6 millimeters; forewing, 4 to 4.5. General color green or yellowish green; forewings whitish or glass clear; antennæ brown or black; dorsum and vertex briefly and sparsely hairy.

Head nearly as broad as thorax, not strongly deflexed, vertex large, broadly concave, median line deeply impressed in anterior half; genal cones as long as vertex, slender and acute, strongly divergent; antennæ about two and one-half times as long as width of head, moderately thick.

Thorax long and narrow; legs slender, rather long. Forewings long and narrow, nearly four times as long as broad, acute at apex, veins with whitish setæ, membrane whitish in color; first marginal cell larger than second, radius very long.

Male (according to Kuwayama) with anal valve about as long as genital segment, much broadened midway in lateral aspect; forceps simple, about as long as anal valve. Female genital segment nearly as long as rest of abdomen, anus large, valves subequal in length, dorsal acutely pointed.

Type locality.—Japan, Hekone, Honshu (*Matsumura*). Philippines—LUZON, Baguio, Benguet (*Baker*), 1 female.

Trioza fletcheri Crawford ('12: 434).

One male specimen taken at Singapore (*Baker*) appears to belong to this species, previous representatives of which were taken in India.

Trioza tenuicona sp. nov. Plate III, fig. 2.

Length of body, 2.2 millimeters; forewing, 4. General color pale brown to dark brown or nearly black; vertex in dark forms light brown; eyes black; antennæ mostly black, basal third sometimes reddish brown; legs light brown or sometimes paler; forewings clear, veins in distal half conspicuously black, yellowish in basal half.

Head broad, nearly as broad as thorax; vertex less than half as long as broad, median suture sulcate cephalad, bulging on each side; genal cones nearly twice as long as vertex, directed vertically downward, slender and acutely pointed, not widely divergent, sparsely hirsute. Antennæ about four times as long as width of head, rather thick.

Thorax arched, broad, with scattering hairs. Legs long and stout; tibiæ very long, hind tibiæ without basal spur, four small spines at apex. Forewings large, broadly rounded at apex, veins thick and heavy, not unicolorous. Hind wings about half as long as forewings or more, narrow.

Abdomen thick. Male forceps half as long as anal valve, rectangular in outline (lateral), truncate at apex, with three teeth on apical margin; anal valve long, broadest at base, tapering to narrow apex. Female genital segment about half as long as rest of abdomen, dorsal valve a little longer than ventral, both subacute.

SINGAPORE (*Baker*), 1 male and 2 females.

Trioza divisa Crawford ('17: 172).

The description of the female genitalia, having been omitted in the first account of this species, is given here. Abdomen very short; genital segment short, but nearly as long as abdomen, dorsal valve a little longer than ventral, both subacute and tawny in color.

LUZON, Benguet Subprovince, Baguio (*Baker*), 1 female. The first specimens, 2 males, were from the same locality.

This species is very close to the Japanese *Trichochermes bicolor* Kuwayama, differing in only a few respects as indicated in the foregoing key.

Trioza diptera sp. nov. Plate III, figs. 6 and 7.

Length of body, 1.9 millimeters; forewing, 3.1. Thorax orange red, abdomen reddish brown on notum and mostly white on venter; vertex pale brown, with three darker stripes, posterior ocelli red; genæ white; antennæ white, with three broad black rings; legs white or pale; wings clear. Body surface more or less white-pulverulent.

Head nearly as broad as thorax, declivous; vertex nearly as long as broad, median suture sulcate, and a long, slightly crescentic sulcus on each side; genal cones broad at base, acutely pointed, strongly divergent, directed forward, pubescent with white hairs. Antennæ about one and one-half times as long as width of head, slender, conspicuously black and white.

Thorax narrow, not much arched. Legs rather short; hind tibiæ without basal spur, with four black spines at apex, three together and one alone. Forewings long, acutely pointed, transparent, marginal cells far separated. Hind wings reduced to mere stubs, almost wanting.

Abdomen long and slender. Male genital segment unusually

long and slender, nearly as long as abdomen, reaching far caudad of forceps, slender and acuminate; forceps a little longer than anal valve, situated near base of genital segment, somewhat triangular in lateral outline, broadest near base, shortly petiolate, converging to blunt point at apex, scarcely arched toward each other; anal valve small, not as long as forceps, with a fingerlike projection caudad below midpoint. Female genital segment about as long as abdomen, slender, acuminate; ventral valve about half as long as dorsal, latter long and slightly constricted midway.

SINGAPORE (*Baker*), 2 males and 2 females.

This is a very striking species, remarkable for its genitalia and differing from most *Triozæ* in wing characters. It should be perhaps referred to a distinct genus. In the next genus, *Megatrioza*, there is a marked tendency toward abortion of the hind wings.

Genus MEGATRIOZA Crawford

Head more or less declivous, usually not as broad as thorax; vertex broader than long; genal cones usually rather short but in a few species long, usually thick and bluntly rounded; frons concealed. Thorax broad or narrow, strongly arched or sometimes nearly flat, usually sparsely clothed with long hairs; legs long, apparently strongly saltatory; metacoxæ with large posterior spurs and also a pair of spiniform processes extending cephalad between bases of hind legs; hind tibiæ with a small or large spur at base, a more or less conspicuous, thick spine or tooth near apex and three smaller spines at extreme apex. Forewings hyaline, sometimes colored, usually acutely pointed, long and narrow, venation triozine with radius and clavus short. Hind wings usually much reduced, seldom more than half as long as forewings and sometimes very greatly reduced. Abdomen short or long; male anal valve broad, with lateral wings produced caudad.

Type of the genus, *Megatrioza armata* Crawford ('15: 264).

This genus was first erected for a single large and striking species of the Philippines. The subsequent study, however, of additional South Pacific psyllids makes it appear that this genus has very many representatives throughout tropical Asia and the South Pacific Islands, and no doubt in other tropical areas as well.

The most striking characteristics of this generic group are the armed hind tibiæ, unusual in Triozinæ; the secondary metacoxal

spurs directed forward, not found in other genera of the family so far as known to me; and the peculiarly long and slender forewings. So many of the species are known to be gall makers or leaf curlers that it probably is a safe surmise that most or perhaps all of the species have similar habits.

One species of southwestern United States, *Trioza diospyri* Ashm., is beyond doubt a representative of this genus and should be referred to it. It has stood heretofore as a species strikingly different from other American *Triozæ*, but nevertheless remaining in that genus. It is quite possible that certain other species of *Trioza* in other parts of the world must be referred to this genus, also.

Key to the species.

a^1. Forewing with media forking well beyond its midpoint; first marginal cell usually a little larger than second.

b^1. Genal cones rather slender, fully as long as vertex; head scarcely declivous; thorax narrow; hind wings about two-thirds as long as forewings.

c^1. Forewings glass clear; antennæ about two and one-half times as long as width of head. (Philippines and Borneo.)
M. armata Crawford ('15: 264).

c^2. Forewings ocherous, transparent; antennæ twice as long as width of head. (Malay Peninsula.) ..... **M. armata ochreata var. nov.**

b^2. Genal cones broad and shorter than vertex or wanting; head usually strongly declivous, thorax broad; hind wings about half as long as forewings or sometimes more.

c^1. Genal cones nearly as long as vertex, broad at base, subacute; head considerably narrower than thorax; female genital segment acutely pointed. (Philippines.) ..... **M. robusta sp. nov.**

c^2. Genal cones about half as long as vertex, bluntly rounded; head nearly as broad as thorax; female genital segment short.

d^1. Length of insect to tip of folded wings about 5 millimeters or less; marginal cells of forewing subequal.

e^1. Dorsum dark brown to black, usually with reddish or orange longitudinal markings; vertex broadly concave between postocelli; antennæ less than twice as long as width of head; insect about 5 millimeters long. (Philippines, Borneo, and Bengal.) ..... **M. eugenioides** Crawford ('17: 171).

e^2. Dorsum uniformly yellowish to light brown; vertex scarcely concave between postocelli; insect about 4 millimeters long. (Fiji; Philippines?) ..... **M. vanuæ** (Kirkaldy) ('07: 104).

d^2. Length of insect about 6 to 7 millimeters; first marginal cell of forewing larger than second.

e^1. Cubitus forked at or near its midpoint; antennæ not quite twice as long as width of head; female genital segment large; general color brown to light brown. (Hawaii.)
M. palmicola Crawford ('18: 452).

e^2. Cubitus forked well distad of its midpoint; antennæ more than twice as long as width of head; female genital segment smaller; general color dark brown to black, with reddish or yellowish stripes and markings. (Malay Peninsula.)
M. gigantea sp. nov.

c^3. Genal cones wanting, genæ slightly or considerably swollen beneath antennal bases; vertex and dorsum very hairy; first marginal cell of forewing very large. (India.)
M. hirsuta Crawford ('12: 427).

a^2. Medial vein forking at or near its midpoint, upper fork (M_{1+2}) joining costa at apex of forewing; marginal cells subequal; genal cones shorter than vertex.

b^1. Thoracic dorsum black, without lighter markings.

c^1. Body slender, nearly all glossy black; hind wings very much reduced; forewings very narrow, radius not margined with black.

d^1. Hind wings reaching to tip of abdomen; male anal valve very large and expansive, reaching caudad of forceps. (Philippines.)
M. magnicauda sp. nov.

d^2. Hind wings reaching about half way to tip of abdomen; male anal valve smaller. (Philippines.)
M. asiatica Crawford ('15: 266).

c^2. Body robust; thorax dull black; hind wings about half as long as forewings, reaching beyond tip of abdomen; forewings broader, basal vein and radius conspicuously bordered with black. (Philippines.) ..... **M. melanoneura sp. nov.**

b^2. Thoracic dorsum brown or lighter, usually more or less striped or banded with orange.

c^1. Male forceps acuminate, uniformly tapering to acutely pointed tip; female ovipositor exserted, styliform; antennæ twice as long as width of head. (Philippines and Malay Peninsula.)
M. stylata sp. nov.

c^2. Male forceps not as above, with a long fingerlike process distad; ovipositor not as above; antennæ less than twice as long as width of head. (Philippines, Malay Peninsula and Archipelago, Fiji, Java, and Ceylon.) ..... **M. vitiensis** (Kirkaldy) ('07: 103).

Megatrioza armata Crawford ('15: 264).

The body color of this species is not uniform as indicated in the first description, but the thoracic dorsum has longitudinal bands of brown with pale brownish or yellow-brown between; vertex brown along median suture; forewings clear except an irregular brown area in clavus. The hind wings in this species are long and narrow, about two-thirds as long as forewings, proportionately longer than in most other species of the genus.

This is one of the large species of the genus, probably having a wide distribution as indicated by its being found in two separated portions of the South Pacific Archipelago.

Type locality.—Philippine Islands. Occurring also in Borneo—Manorg, West Borneo (*Muir*), 1 male; Sandakan (*Baker*), 1 male.

Megatrioza armata ochreata var. nov.

Body a little smaller than the species and slenderer; thorax brown, alternating with a brown or yellow-brown duller than in the species; forewings ochraceous throughout, not clear though nearly transparent; clavus brown. Head similar to the species, except genal cones not longer than vertex; antennæ scarcely more than twice as long as width of head. Thorax similar but slenderer; legs shorter. Forewings narrower, venation similar; hind wings relatively as long as in the species. Male genitalia similar to the species except forceps slenderer than in the species and a little longer than anal valve. Female genital segment not as long as abdomen.

SINGAPORE (*Baker*), 1 pair.

Megatrioza vitiensis (Kirkaldy).

Trioza vitiensis KIRKALDY, Proc. Hawaiian Ent. Soc. 1 (1907) 103.
Trioza eugeniæ CRAWFORD, Philip. Journ. Sci. § D 10 (1915) 265, pl. 1, fig. E, nec Froggatt.

Length of body, 2.6 millimeters; forewing, 5 to 6. General color brown, dorsulum with a pale or yellow central streak and often two lateral ones; mesoscutum with several yellowish or pale longitudinal bands; femora dark brown, tibiæ lighter; antennæ pale yellow, black at tip; forewings clear with a small brown spot at anal angle of both front and hind wings. Color of newly emerged adults usually yellowish or pale brownish yellow, without the markings described above.

Head declivous, not as broad as thorax; vertex about half as long as broad between eyes, sparsely pubescent, deeply impressed on each side of median line, with a transverse sulcus connecting the two foveæ, somewhat convex in anterior half; genal cones about half as long as vertex, broad, rounded, not much divergent, pubescent. Antennæ about one and one-half times as long as width of head. Eyes large.

Thorax strongly arched, rather broad, clothed sparsely with long hairs. Legs long and stout; hind tibiæ stout, with basal spur not very large and apical spines moderately small. Forewings long, about three times as long as broad, acutely pointed, marginal cells very long. Hind wings about half as long as forewings or a little more.

Abdomen short and broad. Male forceps about as long as anal valve or a little shorter, slender, basal two-thirds about three times as long as thick, rounded apically, and distal third abruptly narrowed with a fingerlike process directed inward and acutely pointed; anal valve about as broad as long, lateral

wings broadly convex. Female genital segment very short, much shorter than abdomen, dorsal valve a little longer than ventral, both subacute.

Type locality.—FIJI ISLANDS, Rewa (*Muir*), March, 1906, 3 males and 2 females.

SINGAPORE (*Baker*), 1 pair. AMBOINA (*Muir*), 1 female. Pemalonga (*Leeuwen-Reijnvaan*), 1 male and 1 female, on *Eugenia malaccensis*, April 10, 1912. CEYLON, Peradeniya (*A. Rutherford*), 9 males and females from galls on leaves of *Eugenia malaccensis*, May 12, 1913 (described as *Trioza eugeniæ*).

This appears to be a widely distributed species in the South Pacific in tropical Asia, making galls on *Eugenia malaccensis* (known also as *Jambosa domestica*). The name *Trioza eugeniæ*, applied to some newly emerged Ceylonese representatives of this species, was preoccupied by an Australian species named by Froggatt, but subsequent study shows the species to belong to *Megatrioza* and furthermore to be synonymous with Kirkaldy's *T. vitiensis*. The Fiji specimens before me bear no identification mark indicating that they were examined by Kirkaldy, but they agree well with his description of *T. vitiensis* and probably are paratypes in as much as the date of collection and locality are identical in both lots.

Megatrioza stylata sp. nov. Text fig. 1.

Length of body, 3 millimeters; forewing, 5 or more. General color brownish yellow to brown; pronotum, medial portion of thoracic dorsum, and abdomen dark brown or black; legs and antennæ yellowish, latter black distad; forewings clear.

FIG. 1. *Megatrioza stylata* sp. nov.

Head strongly descending, narrower than thorax; vertex nearly three times as broad as long, median suture impressed and a foveal depression on each side, sparsely pubescent. Genal cones broad, rounded, more than half as long as vertex, hairy. Antennæ about twice as long as width of head, segments 3 and 4 a little thicker and more setose than following segments.

Thorax very broad and large, sparsely hirsute. Legs stout, hairy; hind tibiæ long with basal spur small and apical spines moderately large. Forewings large, transparent, acutely pointed,

marginal cells long and large. Hind wings about half as long as forewings.

Male forceps long, acuminate, curved, acutely pointed, hairy. Anal valve a little longer than forceps, broadest at base, somewhat triangular in outline, about twice as long as basal width. Female genital segment about half as long as abdomen, dorsal valve a little longer than ventral, both subacute. Ovipositor very slender and acute, styliform, exserted.

SINGAPORE (*Baker*), 1 pair. LUZON, Laguna Province, Mount Maquiling (*Baker*), 1 female.

In wing venation this species is apparently allied closely to *M. vitiensis.*

Megatrioza asiatica Crawford.

Trioza asiatica CRAWFORD, Philip. Journ. Sci. § D 10 (1915) 266.

This species must be referred to *Megatrioza,* although the basal spur of the hind tibia is almost wanting and the subapical spine is very near the apex. The large anterior metacoxal spurs and the shape and venation of the forewings indicate a close alliance to *Megatrioza* species. The hind wings in this species are remarkable in being reduced to mere stubs that are not at all functional.

This and the following species (*M. magnicauda*) bear a closer similarity to the American *T. diospyri* Ashmead than any other known species, indicating a probable relationship.

MINDANAO, Davao (*Baker*), 1 pair.

Megatrioza magnicauda sp. nov. Text fig. 2.

Length of body, 2 millimeters; forewing, 4. General color glossy black; antennæ yellowish, black at tip; legs black, hind tibiæ yellowish or whitish on basal two-thirds; forewings clear, a black spot in clavus.

Head and thorax similar to *M. asiatica,* to which this species is closely related, but distinctly narrower; genal cones a little shorter and directed more downward than forward; antennæ a little shorter. Forewings relatively a little broader and marginal cells shorter and broader; hind wings reaching to end of abdomen, while in the related species they scarcely reach half way there.

FIG. 2. *Megatrioza magnicauda* sp. nov.

Male forceps similar, but anal valve immense, reaching caudad beyond forceps, rectangular in outline with anal opening much

elevated. Female genital segment longer and more acutely pointed.

LUZON, Mount Limay (*Baker*), 1 pair.

This is obviously close to *M. asiatica* but appears to be a distinct species.

Megatrioza eugenioides Crawford.

Trioza eugenioides CRAWFORD, Philip. Journ. Sci. § D 12 (1917) 171.

Length of body, 2 millimeters; forewing, 4. General color chocolate brown with orange yellow markings; vertex flavous; dorsulum brown with a flavous stripe down center and flavous borders; mesoscutum with several tawny stripes and bands; legs except hind femora and antennæ except at tip yellowish; forewings clear with a black spot in clavus.

Head nearly as broad as thorax, only a little declivous; vertex about half as long as broad, with a deep, brown, foveal depression on each side of median line; anterior ocellus in front; genal cones directed downward, about half as long as vertex, narrowly rounded at apex. Antennæ very slender, about one and one-half times as long as width of head.

Thorax somewhat arched, reticulately marked, sparsely pubescent. Hind tibiæ with two small spurs at base close together, subapical spines moderately large. Forewings clear, very transparent; hind wings a little more than half as long as forewings.

Female genital segment very short, bluntly pointed.

MINDANAO, Butuan (*Baker*), 3 females. INDIA, Pusa, Bihar (*Misra*), 1 female taken on the wing, January 26, 1914. BORNEO, Sandakan (*Baker*), 1 female. The last specimen differs slightly from the others in being less pubescent on the dorsum. This species appears to be a widely distributed one and may prove to be identical with some already-known species of *Trioza*.

Megatrioza vanuæ (Kirkaldy).

Trioza vanuæ KIRKALDY, Proc. Hawaiian Ent. Soc. 1 (1907) 104.

Length of body, 2 millimeters; forewing, 3.2. General color yellowish to light brown, abdomen brown to black on basal half, reddish brown caudad; vertex light brown, with a narrow black line down center. Dorsum very sparsely hairy.

Head nearly as broad as thorax, broader than prothorax, not strongly deflexed; vertex only slightly impressed on either side of median line, postocelli scarcely elevated; genal cones short, broadly rounded, not half as long as vertex. (Antennæ broken off at base.)

Thorax not broad nor much arched; pronotum somewhat de-

pressed and with projecting episternum (dorsal aspect) appearing somewhat like a collar. Legs moderately long, femora stout; hind tibiæ with an inconspicuous spur at base and a prominent spiniform tooth near apex. Forewings long and slender, three times as long as broad, acute at apex, wholly hyaline, marginal cells about equal in size, radius short. Hind wings about half as long as forewings, very narrow and delicate.

Female genital segment short, not longer than preceding tergite, with an abruptly acute apex.

FIJI ISLANDS, Rewa (*Muir*), March 3, 1916, 1 female. LUZON, Laguna Province, Mount Maquiling (*Baker*), 1 male doubtfully of this species. The latter specimen is so imperfectly preserved that its identity is a matter of doubt, but it appears to represent this species. The forceps are nearly as long as anal valve, triangular in lateral aspect, about three times as long as basal width, acutely pointed. Anal valve with caudal margin somewhat sinuate, bulging caudad midway.

The specimen from Fiji bears the same date of collection as that examined by Kirkaldy, but there is no indication that he had examined it.

Megatrioza gigantea sp. nov.

Length of body, 3.6 millimeters; forewing, 4.3. General color brown and orange yellow; vertex yellowish, brown on posterior portion; thoracic dorsum variegated with brown and dull yellow; pleuræ yellowish; abdomen mostly brown; femora brown but remainder of legs yellowish; antennæ reddish, black at tip; eyes brown; forewings clear with black spot on anal angle.

Head nearly as broad as thorax, about 1 millimeter wide, somewhat declivous; vertex hirsute, about half as long as broad, nearly rectangular in outline, with median suture depressed and a prominent sulcus on each side connected by a transverse, slightly impressed, black line near middle of vertex. Genal cones declivous, thick, about half as long as vertex, bluntly rounded distad. Antennæ a little more than twice as long as width of head, slender.

Thorax very large and broad, well arched, slightly hirsute. Legs stout, hirsute; hind tibiæ with two basal spurs, a large subapical spine and three large apical spines. Forewings very large, acute apically, veins thin, membrane delicately transparent.

Abdomen short and thick. Female genital segment short, dorsal valve a little longer than ventral, bluntly rounded. Ovipositor sheath heavy and conspicuously serrate.

PENANG (*Baker*), 1 female.

Megatrioza robusta sp. nov.

Length of body, 3 millimeters; forewing, 5.1. General color brown and dull yellow; pronotum brown; meso- and metanotum alternating brown and dull yellow streaks; abdomen mostly brown; legs and antennæ yellowish, latter brown at tip; forewings clear, with a small black spot on anal angle.

Head considerably narrower than thorax, declivous; vertex sparsely hirsute, about half as long as broad, front and hind margins subparallel, arcuate forward, with a foveal depression on each side of median line. Genal cones nearly or quite as long as vertex, slightly declivous, broad at base, subacutely pointed. Antennæ scarcely twice as long as width of head.

Thorax very broad and robust, sparsely hairy, finely impunctate; legs rather short and stout; hind tibiæ with small spurs at base, apical and subapical spines moderately large. Forewings large, clear, acutely pointed. Hind wings about half as long as forewings, narrow.

Abdomen short and thick. Female genital segment short, dorsal valve a little longer than ventral, both subacute.

LUZON, Mount Banahao (*Baker*), 1 female.

Megatrioza melanoneura sp. nov.

Length of body, 3 millimeters; forewing, 5. General color dark brown to black; vertex, genæ, thoracic pleuræ, hind tibiæ, and antennæ all dull reddish yellow; antennæ and hind tibiæ black distad; forewings clear, with a black spot on anal angle and a black band following basal vein along radius to costal margin.

Head narrower than thorax, declivous. Vertex about half as long as broad, sparsely hairy, bulging roundly in front, with a transverse depression extending from in front of posterior ocelli arcuately toward occipital margin of head. Genal cones declivous, about half as long as vertex, bluntly rounded, hairy. Antennæ about one and one-half times as long as width of head.

Thorax broad, well arched, sparsely hairy. Legs thick, very hairy; hind tibiæ with small basal spur, a moderately large subapical spine and two apical spines. Forewings large, transparent, veins narrow and black; basal and radial veins conspicuous by the black border. Hind wings about half as long as forewings.

Abdomen large and thick. Male forceps about as long as anal valve, slender, arched and subacutely pointed. Anal valve moderately long, about one-third as broad at base as long, nar-

rowing toward apex. Female genital segment about three-fifths as long as abdomen, converging to an acute point, dorsal valve a very little longer than ventral.

LUZON, Mount Banahao (*Baker*), 1 male: Benguet Subprovince, Baguio (*Baker*), 1 female.

Megatrioza hirsuta Crawford.

Kuwayama hirsuta CRAWFORD, Rec. Indian Mus. 7 (1912) 427, pl. 33, figs. V, Y; pl. 35, fig. I.

With additional material of this species available for comparison, it now appears that it must be referred to *Megatrioza*. The wing venation, the spurred hind tibiæ, the anterior metacoxal projections, and the gall-forming habit, all relate this undoubtedly to this genus rather than to *Kuwayama*, in which it was first placed with much hesitation. The genæ are scarcely swollen beneath the vertex and not at all conical, but there is a strong tendency in *Megatrioza* toward the suppression of the genal cones. The large size and the hairy head and thorax make this a striking species.

INDIA, Lonavla, Bombay (*H. H. Mann*), 1 male, in galls on *Terminalia tomentosa*, July, 1916.

Genus CEROTRIOZA Crawford

Head scarcely declivous, rather long; vertex produced in front into two hornlike epiphyses; genæ produced into cones directed forward; antennæ slender. Thorax not strongly arched, narrow; hind tibiæ with small basal spur or callus and subapical spine (as in *Megatrioza*). Forewings narrow, opaque or semiopaque, maculated, first marginal cell usually larger than second; hind wings nearly as long as forewings.

Type of the genus, *Cerotrioza bivittata* Crawford ('18: 454).

This genus appears to be related to, probably sprung from, *Megatrioza* but differs sharply in the thickened and semiopaque forewings and peculiarly shaped vertex. The type species is one found in the Hawaiian Archipelago.

Key to the species.

a^1. Genæ produced into more or less conical processes directed forward, without dark vitta on each side of body.

b^1. Length of insect to tip of folded wings about 3 millimeters; color dark brown; vertex horns nearly half as long as genal cones. (Singapore.) ..... **C. corniger sp. nov.**

b^2. Length to tip of folded wings about 4 millimeters; vertex horns much smaller. (Borneo.) ..... **C. microceras sp. nov.**

a^2. Genæ not produced into conical processes, but somewhat spherically swollen beneath antennal bases and protruding vertex; with a prominent dark vitta on each side of head and thorax and extending to tip of each forewing. (Hawaii.)

C. bivittata Crawford ('18: 454).

Cerotrioza corniger sp. nov. Plate III, fig. 12.

Length of body, 1.9 millimeters; forewing, 2.6. General color brown, mottled and banded with yellowish white; vertex with margins and median suture bordered with dirty white; pronotum with three whitish points; notum of thorax with irregular stripes and bands of dirty white; abdomen mostly dark brown; legs yellowish, femora with brown spots; antennæ pale brown.

Head slightly declivous, as broad as thorax; vertex about three-fifths as long as broad between eyes, with a relatively large foveal depression on each side of median line, anterior horns situated over genal cones and about half as long as latter, acute and upturned; front ocellus visible from above; genal cones about half as long as vertex, directed forward, divergent, bluntly pointed, scarcely hairy. Antennæ about one and one-half times as long as width of head, slender.

Thorax narrow. Legs long and slender, especially the tibiæ; hind tibiæ with very small basal spur and a larger, black subapical spine. Forewings nearly opaque, membrane thickened and whitish or pale brownish with numerous small, dark brown spots all over; broadest subapically but the apex abruptly acutely pointed; first marginal cell about twice as large as second.

Abdomen long. Female genital segment nearly as long as abdomen, slender, acutely pointed.

SINGAPORE (*Baker*), 1 female.

Cerotrioza microceras sp. nov. Plate III, fig. 10.

Length of body, 2.2 millimeters; forewing, 3.1. General color grayish white with pale brown markings on mesonotum and pleuræ; legs pale; antennæ yellowish with black tip; abdomen light brown.

Head somewhat declivous, not quite as broad as thorax; vertex about three-fourths as long as broad, with an irregular star-shaped depression on each side of median line, a pair of small epiphyses in front adjoining median suture and a larger pair outside of these, the latter scarcely one-fourth as long as genal cones; front ocellus visible from above. Genal cones a little more than half as long as vertex, divergent, bluntly pointed, directed forward, somewhat pubescent. Antennæ a little more than twice as long as width of head.

Thorax narrow, somewhat arched; legs not as long as in related species; hind tibiæ with distinct basal spur and large subapical spine. Forewings nearly opaque, membrane thickened and whitish, with numerous small, light brown spots all over. Shaped as in related species, but apex more pointed.

Abdomen long. Female genital segment as long as abdomen, acutely pointed, slender.

WEST BORNEO, Mowong (*Muir*), 1 female.

Genus **STENOPSYLLA** Kuwayama

Head declivous, not as broad as thorax; genæ produced into conical processes, not covering frons completely but nearly so; clypeus subspherical; beak of median length. Antennæ long, very thick and thickly pubescent. Eyes large. Thorax broad; legs stout; hind tibiæ with basal spur and subapical spine and several apical spines. Forewings large, hyaline, triozine in venation, radius very long.

Type of the genus, *Stenopsylla nigricornis* Kuwayama.

This genus bears some resemblance to *Bactericera* but differs in the very pubescent antennæ and presence of genal cones. In the armature of the hind tibiæ there is a close similarity to *Megatrioza*.

Key to the species.

a^1. Body yellowish or light brown, dorsum flecked with brown; genal cones acutely pointed; antennæ half as long as forewings; insect about 5 or 6 millimeters long. (Formosa.)
S. nigricornis Kuwayama ('10: 54).

a^2. Body light brown, dorsulum and vertex black or dark brown; genal cones broadly rounded at apex; antennæ three-fourths as long as forewings; insect 6 to 7 millimeters long. (Philippines.)
S. longicornis sp. nov.

Stenopsylla longicornis sp. nov. Text fig. 3.

Length of body, 4 millimeters; forewing, 6; antennæ 4.5. Dorsulum and eyes dark brown or black; vertex, mesoscutum and abdominal notum brown; rest of body orange yellow to light brown; antennæ brown to black; legs orange yellow.

Head much narrower than thorax, strongly declivous; vertex smooth, broadly concave, about half as long as broad, median suture longer than lateral edges, without foveal depressions. Genal cones nearly as long as vertex, directed vertically downward, broad and bluntly rounded, divergent, sparsely hairy. Frons slightly visible at front ocellus. Antennæ about five times as long as width of head; segments 1 and 2 short and thick,

not hairy; 3 and 4 as thick as 2 and densely covered with stiff setæ set on tiny tubercles; 5 to 10 gradually becoming more slender, about half as thick at tip as segment 3, all uniformly densely setose.

Thorax very broad, well arched, surface smooth and glossy. Legs short and stout; hind tibiæ a little longer than femora, with a moderately large basal spur and large distal spines.

FIG. 3. *Stenopsylla longicornis* sp. nov.

Forewings large, acutely pointed, hyaline, veins heavy, costa setose; radius very long; first marginal cell much larger than second.

Abdomen stout. Female genital segment about half as long as abdomen, dorsal valve a little longer than ventral, subacute, descending.

LUZON, Laguna Province, Mount Maquiling (*Baker*), 1 female.

This appears to be very close to the Formosan species of the same genus, but is a larger insect and differs structurally as well as in coloration.

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ILLUSTRATIONS

Plate I

Fig. 1. *Pauropsylla brevicornis* sp. nov., forewing.
2. *Pauropsylla brevicornis* sp. nov., antenna.
3. *Pauropsylla verticis* sp. nov., forewing.
4. *Pauropsylla verticis* sp. nov., female genital segment.
5. *Leptynoptera sulfurea* g. et sp. nov.
6. *Leptynoptera sulfurea* g. et sp. nov., basal segments of antenna.
7. *Pauropsylla apsylloides* sp. nov.
8. *Paurocephala minuta* sp. nov.
9. *Paurocephala maculata* sp. nov.
10. *Paurocephala conigera* sp. nov.
11. *Heteroneura oceanica* g. et sp. nov.
12. *Heteropsylla longicornis* sp. nov.

Plate II

Fig. 1. *Tyora indica* sp. nov.
2. *Thysanogyna minor* Crawford, caudal view of male forceps.
3. *Tenaphalara malayensis* sp. nov.
4. *Thysanogyna minor* Crawford, lateral view of female genital segment.
5. *Tenaphalara striata* sp. nov.
6. *Tenaphalara triozipennis* sp. nov.
7. *Euphalerus grandis* sp. nov.
8. *Euphalerus maculosus* sp. nov.
9. *Arytaina meridionalis* sp. nov.
10. *Arytaina flava* sp. nov.
11. *Arytaina iolani* sp. nov.

Plate III

Fig. 1. *Arytaina punctinervis* sp. nov.
2. *Trioza tenuicona* sp. nov.
3. *Arytaina pulchra* sp. nov.
4. *Arytaina brevigena* sp. nov.
5. *Psylla muiri* sp. nov.
6. *Trioza diptera* sp. nov., male genitalia.
7. *Trioza diptera* sp. nov., forewing.
8. *Psylla leprosa* sp. nov.
9. *Psylla bakeri* sp. nov.
10. *Cerotrioza microceras* sp. nov.
11. *Psylla compta* sp. nov.
12. *Cerotrioza corniger* sp. nov.

Text figures

Fig. 1. *Megatrioza stylata* sp. nov.
2. *Megatrioza magnicauda* sp. nov.
3. *Stenopsylla longicornis* sp. nov.

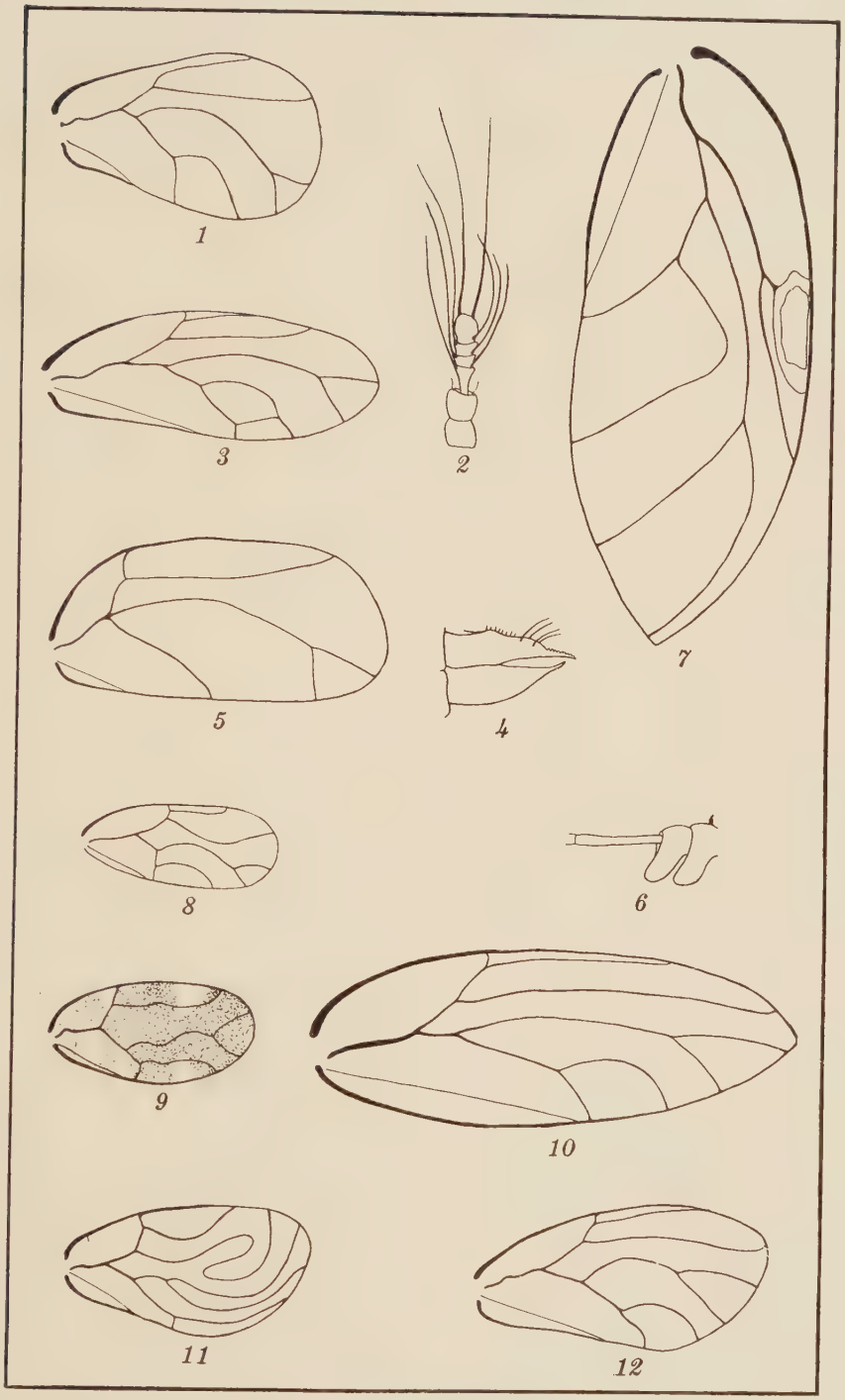
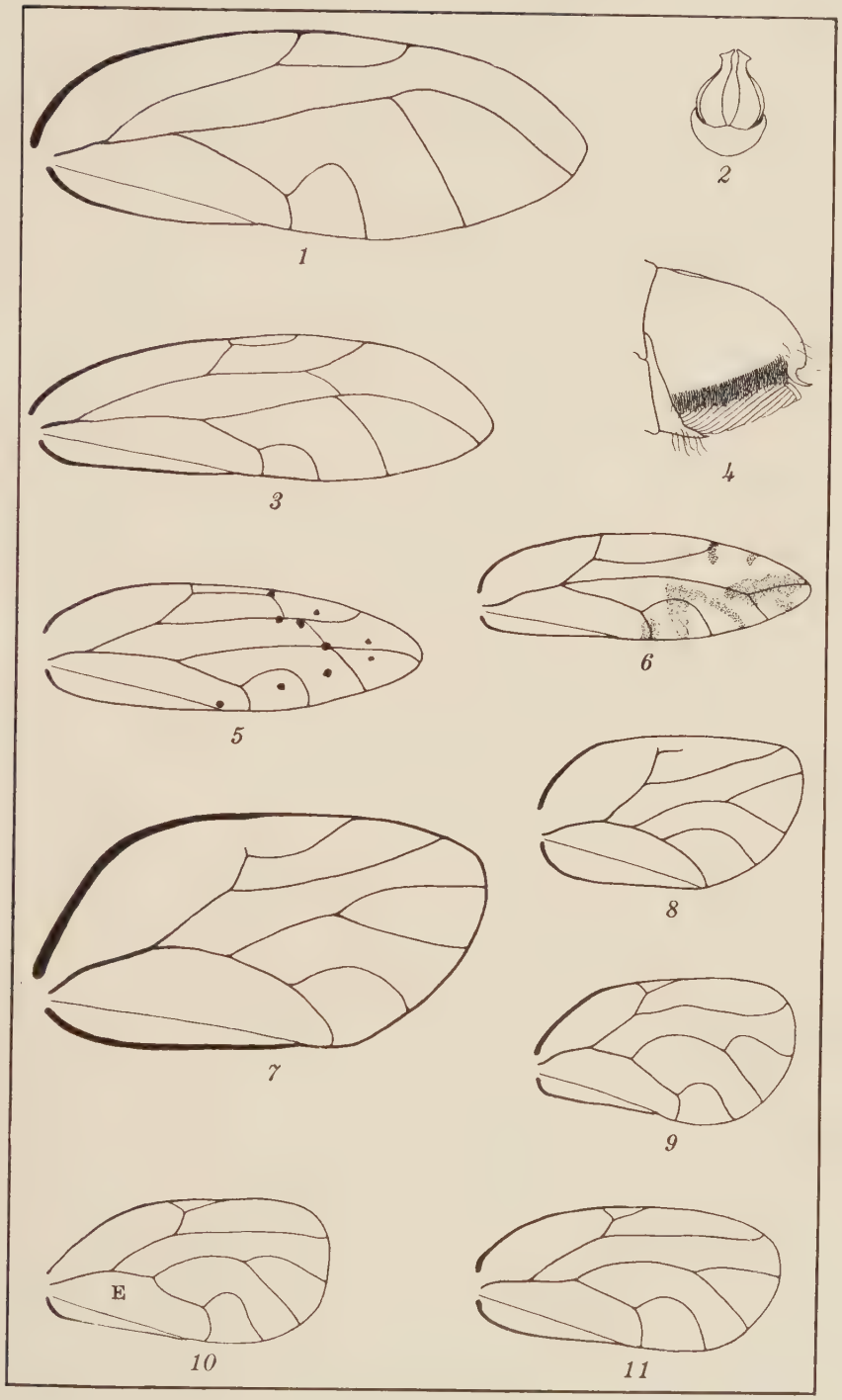


PLATE I. NEW PSYLLIDÆ.



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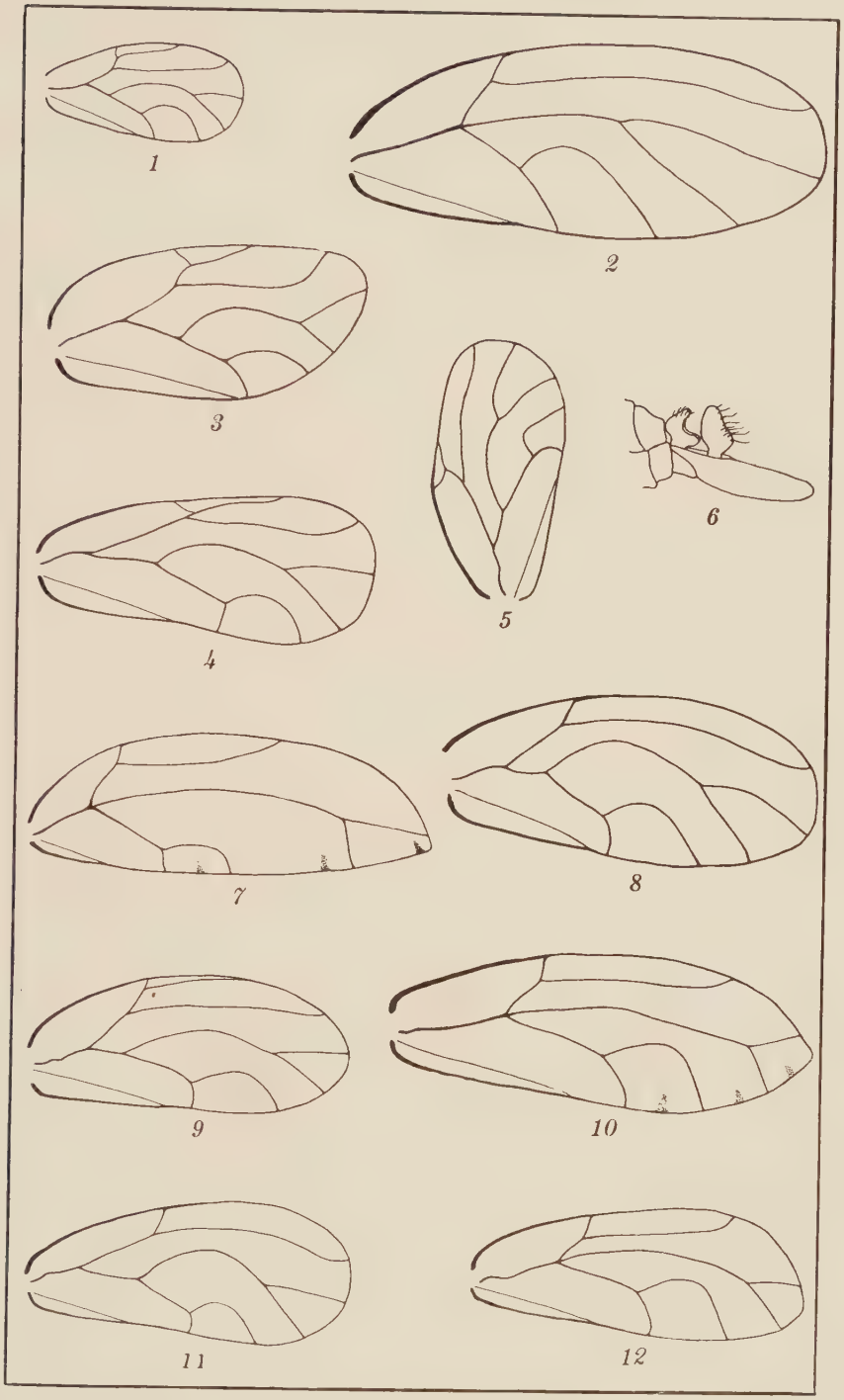

PLATE III. NEW PSYLLIDÆ.

THE GENUS KRISNA (JASSIDÆ)

By C. F. Baker

Of the College of Agriculture, University of the Philippines, Los Baños

FIVE PLATES

The Orient possesses an extensive fauna of large, fine jassoid insects related to *Selenocephalus*. These are all stout-bodied, short-headed jassids and commonly with the face, or the vertex, or the pronotum, or all three, coarsely sculptured, this sculpturing commonly consisting of transverse rugosities or wrinkling, and frequently with the clavus and the base of the corium strongly punctate or rugose-punctate. The anterior border of the head varies from sharp margined to very obtusely rounded between the vertex and the face.

In general, the jassids in question are distinguished by two important structural characters. The antennal scrobes are large, and not confined to the cheek, but involve a portion of the lateral surface of the frons, and are overhung by a thick, sharp, margined ledge, which passes on to the frons, the carinate edge curving downward on the latter, in some cases nearly to the clypeus. The lateral margin of the frons thus passes upward through the scrobe and cuts the supra-antennal ledge. Neither previous descriptions nor drawings bring out this important structural feature, and previous drawings of the face are uniformly incorrect as to this area. The ocelli are on the upper anterior border of the head or near it, near to the eyes, and often visible from above. The actual superior frontal border is just below the ocelli; this suture is rarely distinct, though frequently rudimentary at the sides. The anterior border of the head may be margined by a more or less sharp transverse carina above the ocelli, and at the same time may have another similar carina just below the ocelli, in which case we say that the ocelli lie in a transverse furrow or sulcus. Either one or both of these carinæ may be absent or there may be several sharp transverse carinæ. Sometimes the sulcus is very narrow; at other times, broad with a few to many transverse wrinkles within. Sometimes both carinæ are lacking, and only the transverse band of wrinkles remains. But the wrinkles or the carinæ or the sulcus, in some form, are always present in the members of this group. The

superior frontal margin thus always lies below the apparent upper anterior border of the head, which may not be at all extended above and cephalad of the superior frontal suture, or may be strongly so as in the Tartessusaria. Some of these insects possess a superficial resemblance to bythoscopids, and Walker wrongly described various species of *Tartessus* and other genera in *Bythoscopus*. But in all, including *Tartessus*, the ocelli are far higher and very close to the eyes, and this and other characters mark them as true jassids. In superficial habitus *Krisna* presents a very remarkable resemblance to *Gypona*, so much so that Kirkaldy described a new genus, *Eogypona*, in the Gyponinæ, for one of its species. It has, of course, not the remotest relationship to *Gypona*. In addition, the true Gyponinæ (excluding the Penthimiinæ) are exclusively American.

A minor character common to this assemblage may be observed in the loræ, the suture of which, above, usually does not reach the frontal suture, but commonly ends in a more or less radiate arrangement of minute wrinkles some distance from the frontal margin. In rare cases this suture is subobsoletely extended and strongly recurved to the lateral frontal margin, making the lora ear-shaped. Previous drawings, even those of Signoret, are incorrect in this detail of structure.

The jassids discussed above fall into three tribes as follows:

Key to the tribes.

a^1. Head as wide as or wider than pronotum; frontoclypeal suture usually distinct; lateral pronotal carina very short.

b^1. Pronotum strongly, narrowly rounded cephalad, and extending beyond anterior margin of eyes; ocellar area broad and usually transversely wrinkled; appendix of tegmina usually extending around apex, and very broad apically, rarely wanting as in *Macroceps;* ovipositor long, exserted; *Pediopsis*-like in form..... Tartessusaria.

b^2. Pronotum not extended cephalad of anterior margin of eyes; ocellar area narrow, usually once or several times sulcate; appendix of tegmina usually extending only to apex or less, and broadest subapically; ovïpositor little exserted..... Selenocephalaria.

a^2. Head distinctly narrower than pronotum; frontoclypeal suture obsolete or subobsolete; ocellar area broad and transversely wrinkled and with one or more transverse carinæ above it; lateral pronotal carina (and pronotum behind eyes in lateral view) long; ovipositor little or not exserted; *Gypona*-like in form..... Stegelytraria.

Distant names two of these tribes but gives no diagnostic characters. He places *Krisna* in the Selenocephalaria, but *Gessius*, which might easily be called a subgenus of *Krisna*, he puts in the Tartessusaria. Several genera formerly placed in the Selenocephalaria do not belong in this congeries at all, and a number

of genera formerly classified elsewhere must be removed to it. In fact, some of the species described in *Selenocephalus* do not even belong in the Selenocephalaria. The tribe Tartessusaria includes *Tartessus* Stål, (?) *Borduria* Dist., *Macroceps* Sign., *Putoniessa* Kirk., *Sarpestus* Spang., and *Thymbris* Kirk. Some of these may be synonymous with *Tartessus*. *Drabescus* Stål should be removed to the Selenocephalaria.

The present paper is concerned especially with two genera of the Stegelytraria, the genera of which may be separated as follows:

Tribe STEGELYTRARIA

Key to the genera.

a^1. Tegmina without distinct appendix; length of tegmina beyond clavus about one-third length of clavus.

b^1. Vertex anteriorly horizontally rounded; anterior pronotal margin arched, posterior margin slightly emarginate; tegmina with two subapical cells ..... Stegelytra M. and R.

b^2. Vertex anteriorly subangulate; pronotum anteriorly subtruncate between eyes, posteriorly subtruncate between scutellar angles; tegmina with four subapical cells ..... Iberia Kirk.

a^2. Tegmina with a well-developed appendix; length of tegmina beyond clavus more than half length of clavus.

b^1. Venose portion of tegmina beyond clavus strongly narrowed, the apical cells long and narrow, anterior margin of pronotum broadly rounded between eyes; frons medially never carinate and always much broader than width of eye in facial view.

c^1. Tegmina apically with numerous supernumerary veins (Plate I, figs. 1, 3, and 5) ..... Krisna Kirk.

c^2. Tegmina apically normally without supernumerary cross veins (Plate V, fig. 1) ..... Gessius Dist.

b^2. Venose portion of tegmina beyond clavus not narrowed, the apical cells broad in proportion to length; anterior margin of pronotum narrowly rounded between eyes; frons medially carinate; distance between eyes subequal to width of eye in facial view.

Cœlidioides Sign.

Genus KRISNA Kirkaldy

A common evening visitor to one's table lamp, almost anywhere in the Malaisian countries, is a vividly virescent leafhopper of the genus *Krisna*, a half inch, more or less, in length, and with the transverse fore margin of the vertex black or a bright reddish color. This is likely to be *Krisna strigicollis*, but other species frequently occur. These insects were known for many years under the generic name *Siva* Spinola,[1] but that name being preoccupied, Kirkaldy[2] renamed the genus *Krisna*.

[1] Mem. di Matem. o di Fis. Soc. Ital. Modena (1852) 167.

[2] Entomologist 33 (1900) 243.

The type species of the genus as described by Spinola was *Siva strigicollis,* now supposed to be widely distributed through the Orient. In 1891 Kirby [3] described *striata* from Ceylon, though neither Kirby nor other authors have given diagnostic characters to distinguish it clearly from *strigicollis.* In 1908 Distant [4] described *Krisna sherwilli* from Sylhet, actually separating it on color characters only, which are extremely unstable in this genus, the structural characters mentioned being entirely generic in value or without diagnostic significance. In 1910 Bierman [5] described a *Siva rosea* from Java. Here again most of the structural characters mentioned are only generic in value. Long ago, Walker indicated three species now recognized as pertaining to *Krisna;* namely, *Acocephalus stramineus,*[6] *Bythoscopus indicatus,*[7] and *Bythoscopus testaceus.*[8] Distant refers all of these to *Krisna strigicollis,* but since no author has previously described the diagnostic structural characters of *strigicollis,* and since it is entirely probable that under insufficient description several distinct things have been referred to *strigicollis,* all of this synonymy will have to be reëxamined. In 1901 Breddin [9] attempted to define a *Krisna straminea* Wlk. var. *indicata* Wlk., from Celebes, thereby adding to the usual Walkerian uncertainty, since practically his entire description is composed of generic characters. Several species of the genus have also been described from Africa.

This genus includes a very homogeneous group of species, the form and markings of all being very similar. The vividly virescent species commonly fade to stramineous in dried specimens, and carmine markings usually entirely disappear. When deep olive green or some shade of rufous the color may not change in drying, though in life there is wide variation in the shade of rufous. The black dot at the apex of the clavus is quite constant in most of the species, but the black markings on the vertex are very inconstant, sometimes varying in the same species from a narrow continuous black stripe near the fore margin to separated spots at the middle and sides, and even these may be absent. Specimens of green species may occur with a strong pinkish or reddish tinting.

[3] Journ. Linn. Soc. Zool. 24 (1891) 171.
[4] Fauna Brit. India, Rhynch. 4 (1908) 299.
[5] Notes Leyden Mus. 33 (1910) 61.
[6] List. Hom. 3 (1851) 847.
[7] List. Hom. Suppl. (1858) 266.
[8] Journ. Linn. Soc. Zool. I (1857) 173.
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All of this means that no sound classification of the species (as in most jassids) can be based on colors, but that detailed study must be made of all important features of the external anatomy. Nor does it avail in the least to build up species descriptions by repeating characters common to all or even part of the species in the genus. All of these species are long oval in outline and strikingly gyponoid in form, with the vertex very bluntly angulated or rounded between the eyes (it may be quite different in the sexes); the face and the vertex variously rugose and wrinkled; the pronotum, except anteriorly, thickly and finely cross striate; the scutellum having a strongly curved discal furrow, before which the surface is rugose, behind it, cross wrinkled; and the tegmina more or less thickly punctate. The number and the position of the supernumerary veins vary in the same species. The pronotum always possesses a long, strong, complete lateral carina. The frons is thickly rugose of varying degrees of coarseness. The cheek is slightly roughened below the eye, obliquely wrinkled on the middle third, and rugose below. The clypeus and the loræ are more or less rugosely roughened. The size is variable within narrow limits in all of the species.

Key to the species of Krisna.

a^1. Lower margin of transversely wrinkled ocellar area with several strong, irregular, noncontinuous wrinkles of similar size, and with wrinkles on supra-antennal area; frons below ocellar area not or only moderately depressed; smaller species of slenderer form.

b^1. Frons evenly convex from margin of vertex to clypeus; length of male, 8.5 millimeters..... K. minima sp. nov.

b^2. Frons distinctly depressed below ocellar area; size usually larger.

c^1. Vertex with but one irregular submarginal carina, distinct at least at sides, the entire disk uniformly coarsely rugose.

d^1. Supra-antennal carina passing on to frons in an even curve, or for a short distance straight and then curved; tegmina translucent, the puncturation rather fine.

e^1. Lateral carina of pronotum about same length as eye in lateral view.

f^1. Supernumerary veins numerous; wings milky subhyaline; face concolorous with remainder of undersurface.

K. strigicollis Spin.

f^2. Supernumerary veins few; wings dark smoky.

g^1. Supra-antennal area as broad as long, face concolorous.

K. simillima sp. nov.

g^2. Supra-antennal area longer than broad; frons black.

K. nigrifrons sp. nov.

e^2. Lateral carina of pronotum distinctly longer than eye in lateral view..... K. penangensis sp. nov.

d^2. Supra-antennal carina sharply angled where it crosses frontal suture, from this point passing straight cephalad for a short distance; tegmina thickly coriaceous, opaque, the puncturing very coarse.

e^1. Transverse wrinkles numerous on face above, and fine and regular; supra-antennal area with about ten small wrinkles between its lower point and the ocellus..... K. muirii sp. nov.

e^2. Transverse wrinkles few on face above, and coarse and irregular; supra-antennal area with about five large wrinkles between its lower point and the ocellus.

K. olivascens sp. nov.

c^2. Vertex with a series of about four submarginal carinæ, the posterior incomplete, together occupying about one-half of vertex, the posterior portion of disk rugose; otherwise like the species.

K. olivascens var. singaporensis var. nov.

a^2. Lower margin of transversely wrinkled ocellar area with a strong, uniform, transverse carina, without or with very few weak wrinkles below it, and with the wrinkles above it much weaker; supra-antennal area smoothly concave; frons below ocellar area strongly deeply depressed, and with three large smooth foveate areæ above; puncturation of tegmina minute, weak, sparse, most evident along veins; vertex without a submarginal carina near anterior marginal carina.

b^1. Disk of pronotum very strongly arched; color pale virescent; wings milky subhyaline..... K. magna sp. nov.

b^2. Disk of pronotum very weakly arched; tegmina carmine basally; wings deep smoky..... K. colorata sp. nov.

Krisna minima sp. nov.[10] Plate I, fig. 2; Plate II, fig. 8; Plate III, figs. 3 and 6.

Length, male, 8.5 millimeters. Pale stramineous dry, but doubtless virescent in life. No dark spot at apex of clavus and no dark markings on head. Vertex anteriorly margined with carmine. Similar to *K. strigicollis* but very much smaller.

LAPPA ISLAND, Macao (*F. Muir*).

Krisna strigicollis Spinola. Plate I, figs. 1, 5, 6, and 8; Plate II, figs. 7 and 9; Plate III, fig. 10; Plate IV, figs. 6 and 12.

Length, female, 12 millimeters; male, 10 millimeters. Pale stramineous dry, but vividly virescent in life, with vertex anteriorly bordered more or less broadly with carmine, and with a submarginal black stripe, which is often obsolete on middle of sides, leaving two black dots near margins of eyes and two near median line, but these also may be obsolete. Wings usually milky subhyaline. Last ventral segment of female behind truncate to more or less broadly angularly emarginate.

[10] Characters given in the synopsis are not repeated in the descriptions.

A common species in the Malay Peninsula, Singapore, Borneo, and the Philippines. I also have a specimen taken in Java by Mr. F. Muir.

Krisna simillima sp. nov. Plate II, fig. 2; Plate III, fig. 11; Plate IV, figs. 7 and 9.

Length, female, 11 millimeters. Rufous-stramineous; a submarginal dark dot on either side of vertex near eye margins. Wings smoky. Last ventral segment subtruncate posteriorly.

BORNEO, Sandakan (*Baker*). Larger series may prove this to be an extreme variety of *K. strigicollis*.

Krisna nigrifrons sp. nov. Plate I, fig. 4; Plate II, fig. 10; Plate III, fig. 2; Plate IV, fig. 10.

Length, male, 9 millimeters. Rufous-stramineous. Vertex marked as in *K. strigicollis*. Disks of frons, clypeus, and loræ black.

SINGAPORE (*Baker*).

Krisna penangensis sp. nov. Plate II, fig. 4; Plate III, fig. 8; Plate IV, figs. 5 and 11.

Length, female, 11 millimeters. Pale rufous above, stramineous below, vertex marked as in *K. strigicollis*. Three inner apical cells of tegmina transparent, remainder opaque. Wings smoky. Last ventral segment truncate posteriorly.

PENANG (*Baker*).

Krisna muirii sp. nov. Plate I, fig. 7; Plate III, figs. 13 and 15; Plate IV, figs. 2 and 8.

Length, female, 12 millimeters. Clear rufous above, stramineous below. Vertex with a submarginal fine uniform dark line. Tegmina thickly coriaceous and strongly punctured throughout, the appendix smoky and the inner apical cells stained with smoky. Face with a dark arcuate stripe passing across middle of cellar area. Last ventral segment somewhat angularly emarginate posteriorly.

WESTERN BORNEO, Telok Ayer (*Muir*).

Krisna olivascens sp. nov. Plate I, fig. 3; Plate II, fig. 6; Plate III, figs. 5 and 9; Plate IV, fig. 4.

Length, female, 13 to 14 millimeters; male, 11 millimeters. Deep olive green above, scutellum, anterior portion of pronotum, and vertex paler; below stramineous, tibiæ more or less carmine, the foretibiæ with angular edges black. Vertex an-

teriorly narrowly margined with black, this margined behind with carmine; face above with a submarginal narrow black line, this again margined below with carmine. Tegmina thickly coriaceous, very strongly punctured, the appendix smoky, and some of the inner apical cells stained with smoky. Hind margin of last ventral segment incurved.

This very fine species is not uncommon in Singapore and Penang; and I have specimens from Sandakan, British North Borneo.

A remarkable variety of this species, from Singapore, has the vertex quite differently sculptured, and it is somewhat paler in color, but otherwise similar to the typical form. I call it var. singaporensis var. nov.

Krisna magna sp. nov. Plate II, figs. 3 and 5; Plate III, figs. 1, 4, 12, and 14; Plate IV, fig. 3.

Length, female, 14 millimeters; male, 13 millimeters. Distinct from all other oriental species in the genus by its very robust form, the body being very thick, and very strongly arched across base of pronotum. Very pale virescent above, stramineous below. Vertex anteriorly with two minute black dots next to eyes. No spot at apex of clavus. Wings milky subhyaline. Sexes strikingly different in form of head.

Specimens come from Penang Island and from Sandakan, British North Borneo, though apparently the species is not common. This is the largest known oriental species of the genus.

Krisna colorata sp. nov. Plate II, fig. 1; Plate III, fig. 7; Plate IV, fig. 1.

Length, female, 13 millimeters. Anterior portion of pronotum, vertex, and all below stramineous; pronotum posteriorly and scutellum pale rufous. Tegmina smoky subhyaline, veins and basal two-thirds washed with carmine. Wings deep smoky. Vertex with a marginal line of carmine, and two large black dots near eye margins. Last ventral segment with the margin broadly scarious.

BRITISH NORTH BORNEO, Sandakan (*Baker*).

Genus GESSIUS Distant

There is no question of the very close relationship of this genus to *Krisna;* the venation of the tegmina furnishes the only real means of separating them and even this shows close relationship, in as much as occasional abnormal supernumerary veins

occur in *Gessius*. Here are included some common insects of the Malay Peninsula, Borneo, and the Philippines, which I have no doubt were frequently collected previously; and specimens will probably be found in collections placed with *Krisna*, especially *Krisna strigicollis*.

Among these insects there is a most confusing variation of color shades from bright rufous to stramineous (virescent). All specimens in a large series of several species and varieties possess an unmarked vertex with at most a crimsoned anterior margin, a dot at the apex of the clavus, the wings more or less smoky, the dorsum more or less crimsoned, and all below stramineous. The three or four inner apical cells of the tegmina are subhyaline and impunctate, in strong contrast to the remainder of the tegminal surface.

General sculpturing very similar to that of *Krisna* and similarly distributed.

In all of my material I have no specimens with "the claval area fuscescent, this color longitudinally continued to apex of tegmina" as described by Distant for the type of the genus, *G. verticalis*, from Burma.[11] Is it possible that this fuscescent area is due to the color of the smoky wings beneath?

Key to the Malayan species.

a^1. Transverse wrinkles of ocellar area confined to a space twice the width of an ocellus, the frons suddenly depressed below this, and irregularly rugose; supra-antennal area smooth..... G. malayensis sp. nov.

a^2. Entire upper part of face, down to lower margin of supra-antennal ledges, including supra-antennal areæ, with coarse uniform wrinkles; frons scarcely depressed..... G. pallidus sp. nov.

Gessius malayensis sp. nov. Plate V, figs. 1, 2, 5, 7, 10, and 12.

Length, female, 10.5 millimeters; male, 9 millimeters. Above clear shining pale rufous (variable), below stramineous. The form of the last ventral segment in the female is distinctive, it being deeply, broadly, angularly emarginated, the sides of the emargination sharply notched. Wings very dark veined.

A common species in the Malay Peninsula and Borneo.

A closely similar form is found in Butuan, Mindanao, and in Basilan, which differs only in that the lateral notches in the emargination of the female segment are uniformly shallow and reduced to a strong sinuation. This form may be known as var. mindanaensis var. nov.

[11] Fauna Brit. India, Rhynch. 4 (1908) 302.

Gessius pallidus sp. nov. Plate V, figs. 3, 4, 9, and 13.

Length, female, 10 millimeters; male, 8.5 millimeters. Above stramineous (in life) to pale virescent; veins of wings pale. The truncate last ventral segment of female is distinctive for the typical form of this species. It is the analogue of *Krisna strigicollis* but smaller and slenderer.

SINGAPORE (*Baker*), frequent.

A form very closely similar to this in every way, except that the hind margin of the last ventral segment of the female is shallowly sinuate, occurs commonly at Sandakan, British North Borneo. I name this var. **sinuatus** var. nov.

Another variety, collected at Telok Ayer, Western Borneo, by Mr. F. Muir, is pale rufous above, and has the hind margin of the last ventral segment of the female distinctly incurved, and this may be known as var. **incurvatus** var. nov.

In my Singapore material I have one male specimen, only 8.5 millimeters long, which I cannot separate structurally from the typical form, but which is very dark sordid rufous above, with apical third of tegmina pale. I name this var. **suffusus** var. nov. (Plate V, figs. 6, 8, and 11).

ILLUSTRATIONS

Plate I

Fig. 1. *Krisna strigicollis* Spin., forma; tegmen.
2. *Krisna minima* sp. nov., head and pronotum.
3. *Krisna olivascens* sp. nov., tegmen.
4. *Krisna nigrifrons* sp. nov., head and pronotum.
5. *Krisna strigicollis* Spin., wing.
6. *Krisna strigicollis* Spin., male; head, pronotum, and scutellum.
7. *Krisna muirii* sp. nov., head and pronotum.
8. *Krisna strigicollis* Spin., female; head and pronotum.

Plate II

Fig. 1. *Krisna colorata* sp. nov., head and pronotum; head slightly separated from pronotum in this specimen.
2. *Krisna simillima* sp. nov., head and pronotum.
3. *Krisna magna* sp. nov., female; head and pronotum.
4. *Krisna penangensis* sp. nov., head and pronotum.
5. *Krisna magna* sp. nov., male; head and pronotum; head slightly separated from pronotum in this specimen.
6. *Krisna olivascens* sp. nov., head and pronotum.
7. *Krisna strigicollis* Spin., lateral view of male genitalia.
8. *Krisna minima* sp. nov., male genitalia.
9. *Krisna strigicollis* Spin., male genitalia.
10. *Krisna nigrifrons* sp. nov., male genitalia.

Plate III

Fig. 1. *Krisna magna* sp. nov., male; face.
2. *Krisna nigrifrons* sp. nov., face.
3. *Krisna minima* sp. nov., face.
4. *Krisna magna* sp. nov., female; face.
5. *Krisna olivascens* sp. nov., face.
6. *Krisna minima* sp. nov., head and pronotum, side view.
7. *Krisna colorata* sp. nov., face.
8. *Krisna penangensis* sp. nov., face.
9. *Krisna olivascens* sp. nov., head and pronotum, side view.
10. *Krisna strigicollis* Spin., face.
11. *Krisna simillima* sp. nov., face.
12. *Krisna magna* sp. nov., male; head and pronotum, side view.
13. *Krisna muirii* sp. nov., face.
14. *Krisna magna* sp. nov., female; head and pronotum, side view.
15. *Krisna muirii* sp. nov., head and pronotum, side view.

Plate IV

Fig. 1. *Krisna colorata* sp. nov., female genitalia.
2. *Krisna muirii* sp. nov., head and pronotum, side view.
3. *Krisna magna* sp. nov., female genitalia.

4. *Krisna olivascens* sp. nov., female genitalia.
5. *Krisna penangensis* sp. nov., female genitalia.
6. *Krisna strigicollis* Spin., female genitalia.
7. *Krisna simillima* sp. nov., female genitalia.
8. *Krisna muirii* sp. nov., female genitalia.
9. *Krisna simillima* sp. nov., head and pronotum, side view.
10. *Krisna nigrifrons* sp. nov., head and pronotum, side view.
11. *Krisna penangensis* sp. nov., head and pronotum, side view.
12. *Krisna strigicollis* Spin., head and pronotum, side view.

PLATE V

FIG. 1. *Gessius malayensis* sp. nov., tegmen.
2. *Gessius malayensis* sp. nov., head and pronotum.
3. *Gessius pallidus* sp. nov., head and pronotum.
4. *Gessius pallidus* sp. nov., female genitalia.
5. *Gessius malayensis* sp. nov., female genitalia.
6. *Gessius pallidus* var. *suffusus* var. nov., head and pronotum, side view.
7. *Gessius malayensis* sp. nov., head and pronotum, side view.
8. *Gessius pallidus* var. *suffusus* var. nov., face.
9. *Gessius pallidus* sp. nov., head and pronotum, side view.
10. *Gessius malayensis* sp. nov., antenna.
11. *Gessius pallidus* var. *suffusus* var. nov., head and pronotum.
12. *Gessius malayensis* sp. nov., face.
13. *Gessius pallidus* sp. nov., face.

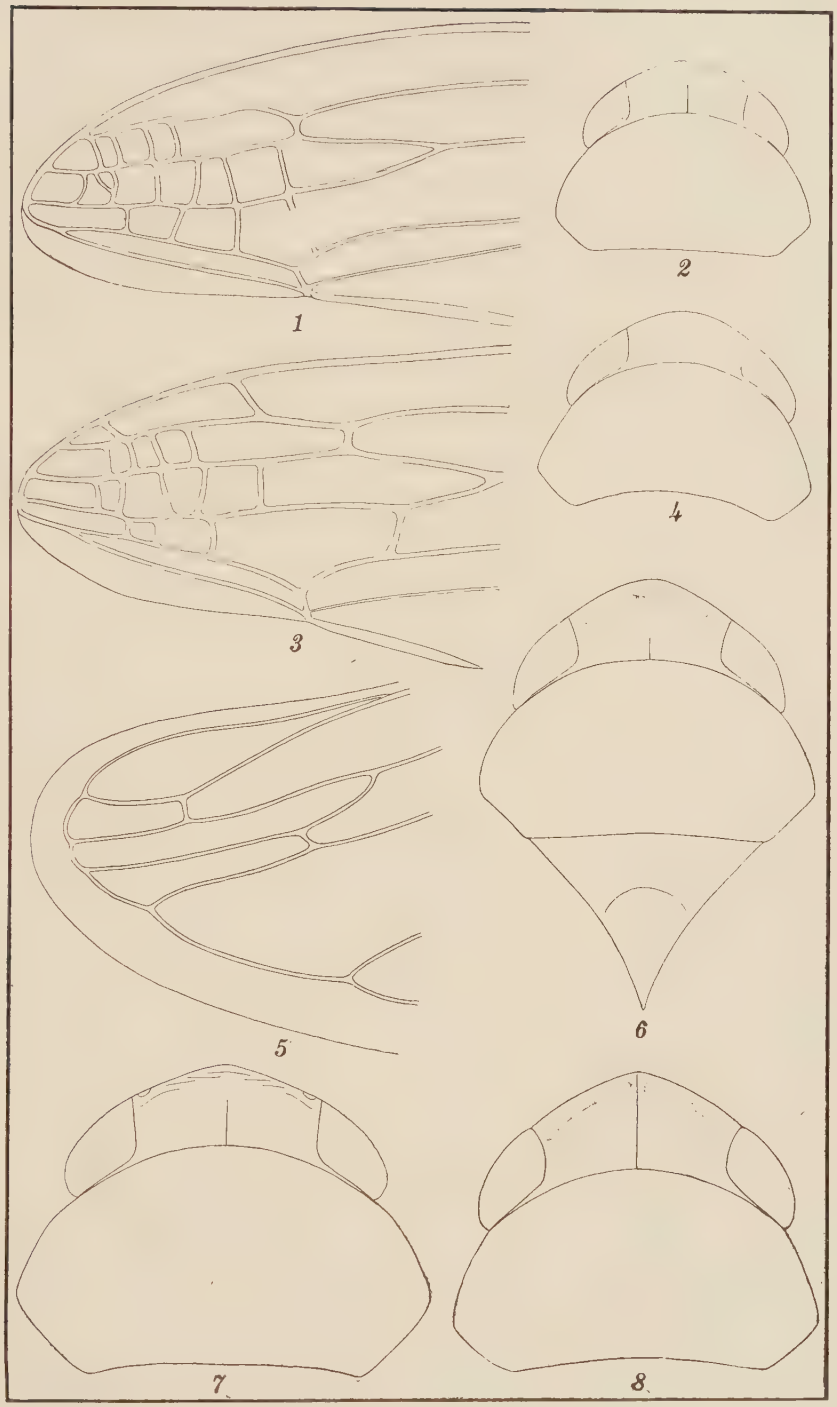

PLATE I. SPECIES OF KRISNA.

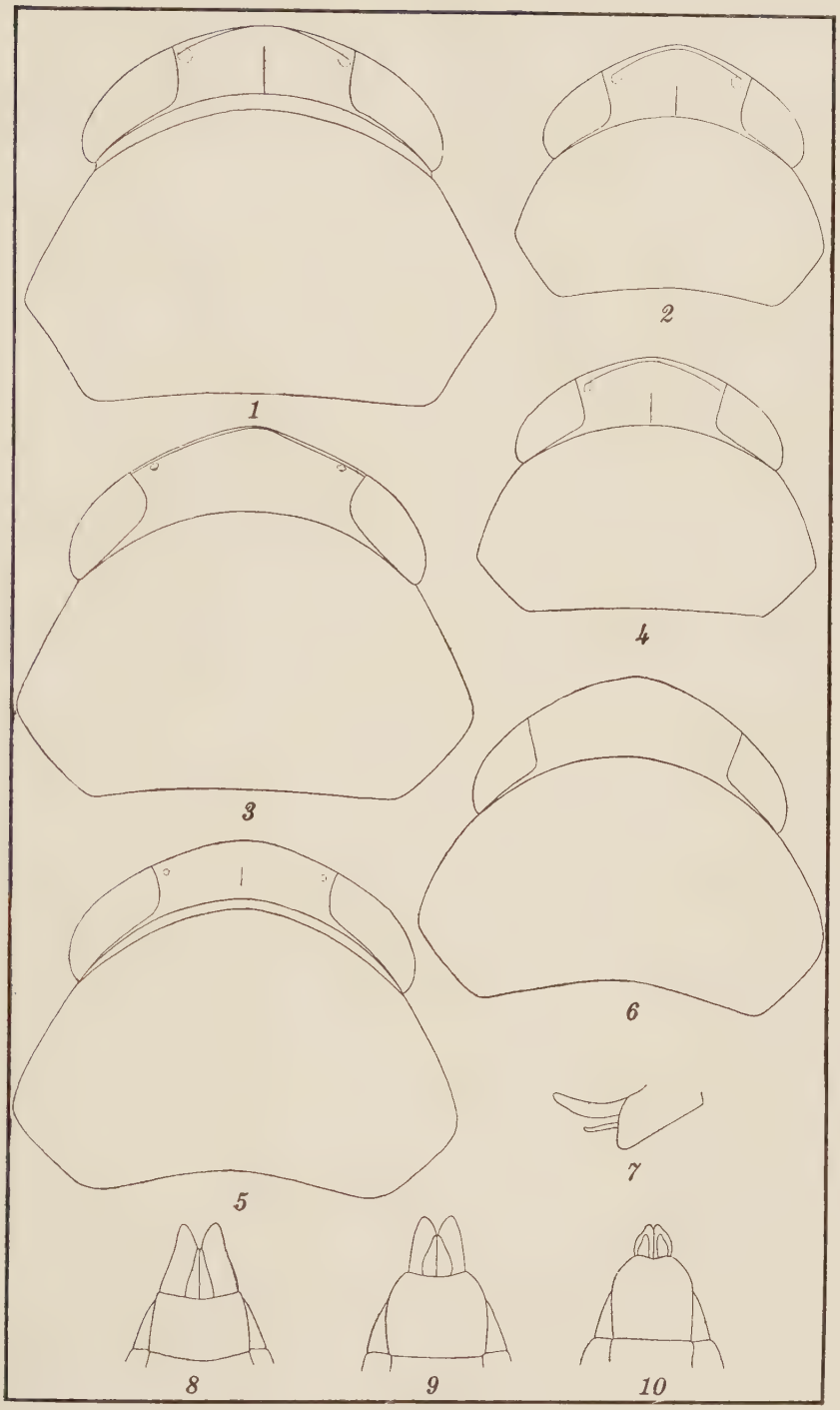

PLATE II. SPECIES OF KRISNA.

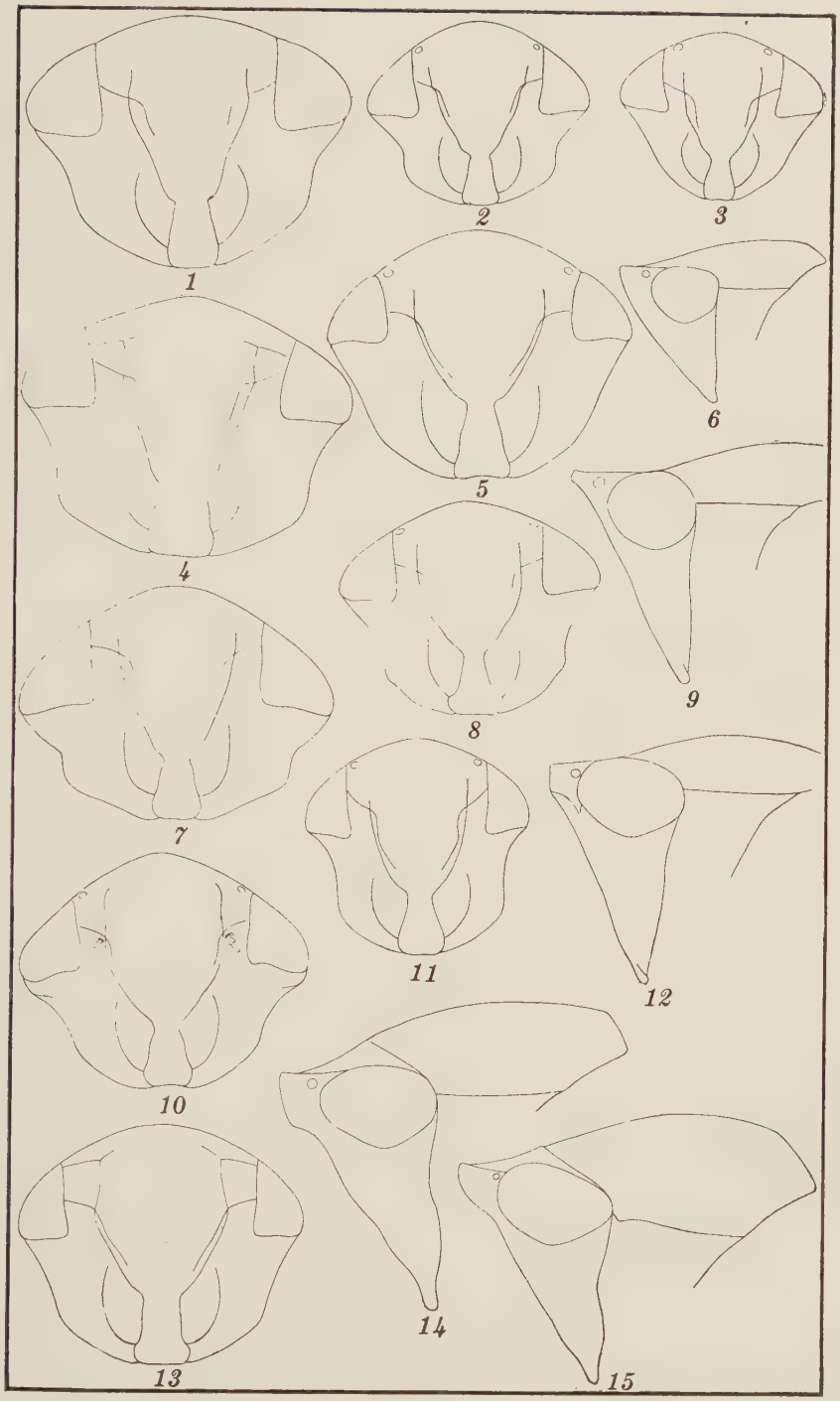

PLATE III. SPECIES OF KRISNA.

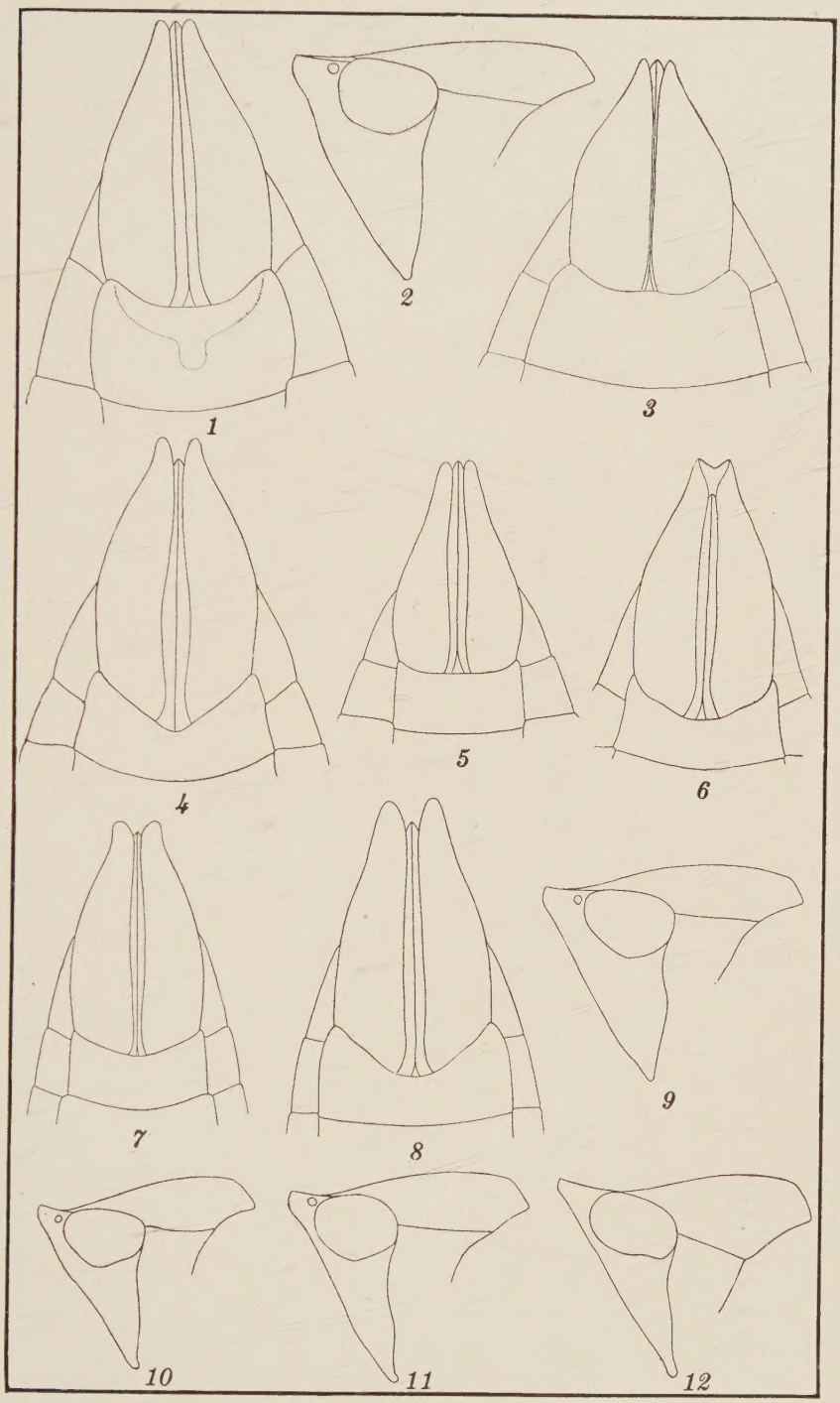

PLATE IV. SPECIES OF KRISNA.

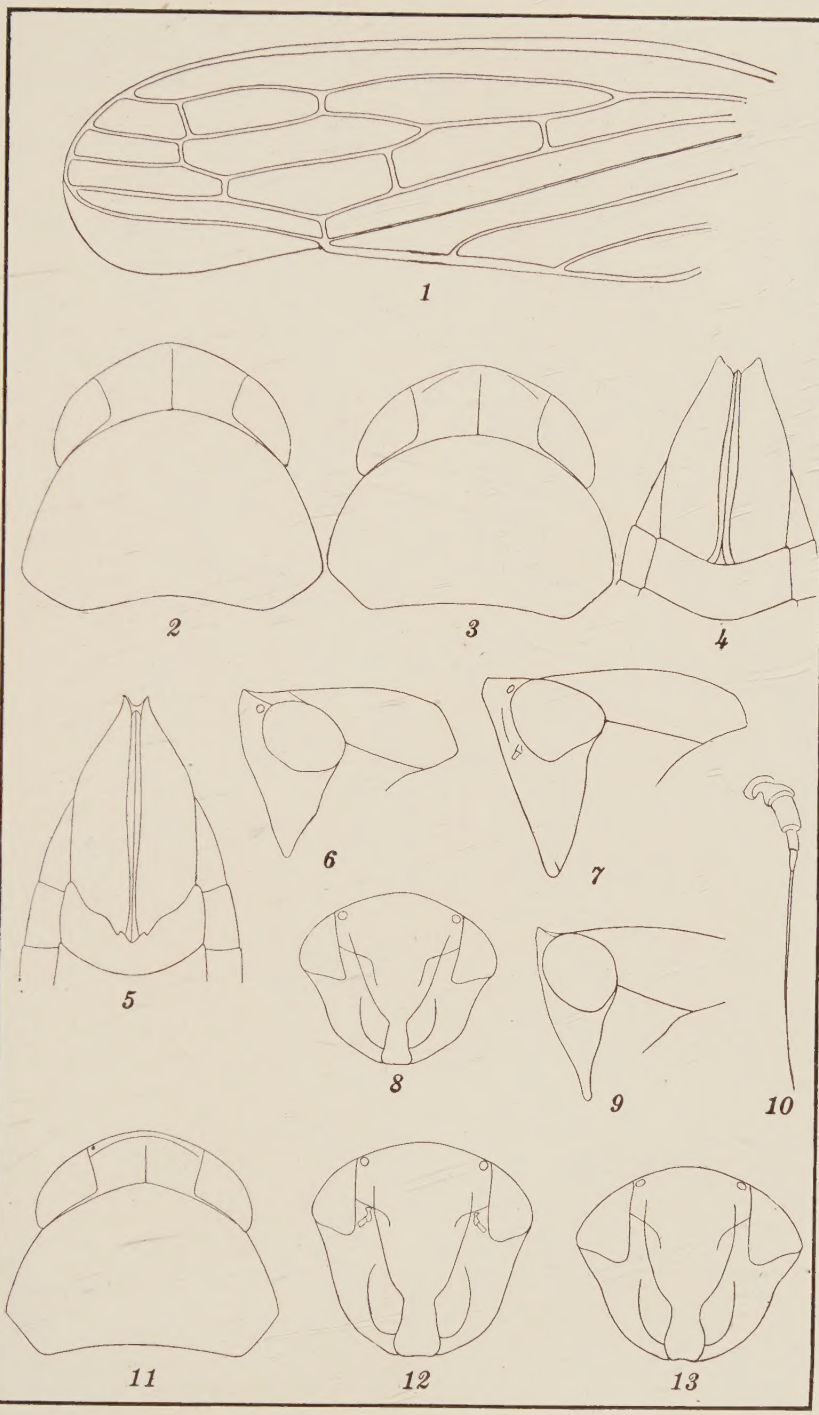

PLATE V. SPECIES OF GESSIUS.